DISSERTATION ON

"A STUDY TO ASSESS THE EFFECTIVENESS OF HALOTHERAPY IN IMPROVING AIRWAY CLEARANCE AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ADMITTED IN SELECTED WARDS IN RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-03''

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" A STUDYTO ASSESS THE EFFECTIVENESS OF HALOTHERAPY IN IMPROVING AIRWAY CLEARANCE AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ADMITTED IN SELECTED WARDS IN RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI03."

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Sd:_____ Sd:_____

Internal Examiner External Examiner

Date: Date:

TAMILNADU DR.M.G.R MEDICAL UNIVERSITY, CHENNAI-32.

CERTIFICATE

This is to certify that this dissertation titled **"A study to assess the effectiveness of Halotherapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03"** is a bonafide work done by **Mrs.S. Barani, II year, M.Sc Nursing student,** College of Nursing, Madras Medical College, Chennai-600003, submitted to **The Tamil Nadu Dr.M.G.R. Medical University, Chennai,** in partial fulfilment of the requirements for the award of degree of Master of Science in Nursing, Branch-I Medical Surgical Nursing, under our guidance and supervision during the academic period from 2015-2017.

Dr.V.KUMARI, M.Sc (N)., Ph D.,
Principal,
College of Nursing,
Madras Medical College,
Chennai-03

Dr.R.NARAYANA BABU, M.D.,DCH
Dean
Madras Medical College,
Chennai-03

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Approved by the Dissertation committee on **12.07.2016**

NURSING RESEARCH GUIDE

Dr.V.KUMARI , M.Sc (N).,Ph D.,
Principal,
College Of Nursing,
Madras Medical College,
Chennai -600003.

CLINICAL SPECIALITY GUIDE

MRS.DOMINIC AROCKIA MARY, M.Sc (N).,
Reader and Head of the Department,
Department of Medical & Surgical Nursing,
College Of Nursing,
Madras Medical College,
Chennai -600003.

MEDICAL GUIDE

PROF.DR.MAYIL VAHANAN., M.D.,
Director
Institute of Internal Medicine
Rajiv Gandhi Government General Hospital,
Chennai -600003.

A dissertation submitted to

THE TAMILNADU DR M.G.R. MEDICAL UNIVERSITY,

CHENNAI- 600032

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"Feeling gratitude and not expressing it is like wrapping a present and not giving it"

-William Arthur Ward

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ABSTRACT

Study Title:

A study to assess the effectiveness of Halotherapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03.

Respiratory disorder is a term that encompasses pathological conditions that affects the organ and tissues that makes gaseous exchange impairment and abnormal mucus accumulation. Chronic obstructive pulmonary disease (COPD) is the name for a collection of lung diseases including chronic bronchitis, emphysema and chronic airway disease which interfere with normal breathing. Halotherapyis also known as dry salt therapy or a form of saline solution inhalation. It means breathing a negative ion rich dry salt micro-climate, just like in natural salt mines. It is a natural safe, non-invasive, alternative therapy which is also very relaxing.

Need for the study:

The increasing need for drug free method of treatment for respiratory diseases, halotherapy ('halos means salt in Greek) is one of such methods. It stimulates a natural salt cave microclimate. As there is a increasing need for the drug free method to decrease the complications and side effects of drugs alternative therapies are needed. Halotherapy plays a major role in decreasing the symptoms of respiratory diseases and improving the airway clearance without any drugs and side effects.

Objectives:

- To assess the symptoms of Chronic Obstructive Pulmonary Disease in Experimental and Control group before administering Halotherapy.
- To assess the effect of Halotherapy in improving airway clearance in experimental group.
- To find the effect of Halotherapy in improving airway clearance of experimental by comparing control group.
- To associate the demographic profile with the post test results.

Key words:

Chronic obstructive pulmonary disease, Halotherapy.

Research Methodology:

Research approach	:	Quantitative research approach
Duration of the study	:	Four weeks 20.11.16 to 18.12.16
Study setting	:	Male and Female medical wards at RGGGH.
Study design	:	Quasi experimental research design-Non Randomized control group design.
Study population	:	Male and Female patients with COPD
Sample size	:	60 Male and Female(Experimental-30, Control-30)
Sampling technique	:	Convenient sampling technique

Data collection procedure:

Data collection done after approval from ethical committee, consent from participants. Airway clearance is assessed by using airway clearance assessment scale which includes respiratory rate assessment, auscultation findings of the lungs, modified O_2 saturation scale, modified medical research council dyspnea scale and oxygen requirement. Halotherapy is administered by using 3% Normal Saline nebulisation twice daily for three days in experimental group only post assessment was done in both the group by using airway clearance assessment scale among patients with chronic obstructive pulmonary disease.

Data Analysis:

Demographic variables in categorical/dichotomous were given in frequencies with their percentages.Symptoms score was given in mean and standard deviation.Difference between experiment and control was analysed using student independent t-test.

Difference between pretest and posttest was analyzed using student paired t-test.Statistical significant difference between pre and post test level of symptoms score was analyzed using extended McNemar's test.Homogeneity between experiment and control group demographic variables are analysed using chi square test.Association between level of symptoms score with demographic variables are analyzed using chi square test.Differences between pretest and posttest difference on effectiveness of study was analysed using percentage with 95% CI and mean difference with 95% CI. Association between symptoms reduction score and Demographic variables was analysed using One way ANOVA F-test and student independent t-test.

Study Results:.

Findings of the study reveals that halotherapy will improve the airway clearance among patients with COPD. In selected demographic variables such as age, sex, occupation and duration of illness had significant ($p=0.01$) association with the post test level of airway clearance. Considering experiment group, patients are reduced 2.23 symptoms score, $t= 13.62$, $p=0.001$, this difference is statistically significant, whereas control group patients reduced 0.47 symptoms score, $t=1.91$, $p=0.06$. This difference is statistically not significant.

Recommendations:

1. Halotherapy can be added as a routine therapy in clinical setting for improving level of airway clearance.
2. The study can be done in different setting with longer duration.

Discussion:

Hypothesis was proved by the great statistically significance occurs after halotherapy. Oneway ANOVA F-test and student independent t-test.shows that there is a association between the post test level of airway clearance with selected demographic variables among patients with chronic obstructive pulmonary disease receiving Halotherapy.

Conclusion:

In conclusion of the study halotherapy is an effective method in improving the airway clearance in patients with chronic obstructive pulmonary disease. So it can be used as a routine therapy for clearing the airway in clinical setting.

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LIST OF ABBREVIATIONS

COPD	:	Chronic Obstructive Pulmonary Disease
ALA	:	American Lung Association
NaCl	:	Sodium Chloride
LOS	:	Length of Hospital stay
OAD	:	Obstructive Airway Disease
WHO	:	World Health Organization
NHANES	:	National Health and Nutrition Examination Survey
SGRQ	:	St. George's Respiratory Questionnaire
SNOT	:	Sino NasalOutcome Test
IGFBP7	:	Insulin-like growth factor binding protein 7.
RGGGH	:	Rajiv Gandhi Government Hospital

MRC dyspnea Scale: (Modified) Medical Research Council

INTRODUCTION

CHAPTER -I

INTRODUCTION

For breath is life, and if you breathe well you will live long on earth.

Sanskrit Proverb

Chronic obstructive pulmonary disease (COPD) is the name for a collection of lung diseases including chronic bronchitis, emphysema and chronic airway disease. The main cause of chronic obstructive pulmonary disease is smoking. The likelihood of developing increases the more the person smokes and the longer he has been smoking. This is because smoking irritates and inflamates the lungs, which results in scarring.

Over many years, the inflammation leads to permanent changes in the lung. The walls of the airways thicken and more mucus is produced. Damage to the delicate walls of the air sacs in the lungs causes emphysema and the lungs lose their normal elasticity. The smaller airways also become scarred and narrowed .These changes cause the symptoms of breathlessness, cough and phlegm associated with chronic obstructive pulmonary disease. Some cases of chronic obstructive pulmonary disease are caused by fumes ,dust, pollution and genetic disorders, but these are rarer.[1]

Chronic obstructive pulmonary disease (COPD) is a life threatening lung disease that interfere with normal breathing- It is more than a "smoker's cough". More than 3 million people died of chronic obstructive pulmonary disease in 2012, which is equal to 6% of all deaths globally that year. More than 90% of all chronic obstructive pulmonary disease death occurs in low and middle income countries.[2]

The primary cause of chronic obstructive pulmonary disease is tobacco smoke (through tobacco use or second hand smoke).The disease now affect men and women almost equally ,due to increased tobacco use among women in high income countries. Chronic obstructive pulmonary disease is not curable but treatment can slow the progress of the disease. According to the ALA(American Lung Association), smoking is linked to about 80% of all chronic obstructive pulmonary disease deaths. In women,

smokers are 13 times more likely to die from chronic obstructive pulmonary disease than non-smoking women. For men, smokers are 12 times more likely to die from chronic obstructive pulmonary disease than their non-smoking counterparts.[3]

Chronic obstructive pulmonary disease is one of the most common respiratory diseases in the world. It usually only starts to affect people over the age of 35. Although most people are not diagnosed until they are in their 50s.It is thought there are more than 3 million people living with the disease in the UK, of which only 90,000 have been diagnosed.

Chronic obstructive pulmonary disease is a preventable and treatable disease with some significant extra pulmonary effects that may contribute to the severity in individual patients. Its pulmonary component is characterized by airflow limitation that is not fully reversible. The airflow limitation is progressive and associated with an abnormal inflammatory response of the lung to noxious particles or gases.[4]

Chronic obstructive pulmonary disease is largely attributable to smoking, however only 15% of smokers develop significant airflow obstruction and chronic obstructive pulmonary disease, suggesting that other factors are involved. Epidemiological studies show that 5-12% of patients with a diagnosis of chronic obstructive pulmonary disease have never smoked.[5]

Most drug therapies of respiratory diseases have only palliative effect with many side effects, especially those with cortico steroids. In order to reduce the chances of complications, it is necessary to follow certain drug free techniques. Halotherapy (halo means salt in Greek) is one of such methods, which uses natural salt cave micro climate.

Halotherapy uses dry aerosol salt microclimate to the respiratory problems. Halotherapy replicates the conditions of speleotherapy. (Speleo- Cave in Greek) micro environment which has been practiced in salt caves of Eastern and Central Europe for over 150 years. Any solution of sodium chloride (NaCl) in water with a concentration of NaCl higher than that found in physiological saline (0.9%) is called hypertonic saline.[6]

Hypertonic (3% to 7%) saline has been used to promote mucus clearance in various inflammatory respiratory diseases by drawing water from the airway epithelium to rehydrate the periciliary layer.

Based on clinical studies, the inhaled salty air has bacteriocides, mucokinetic, hydrophilic, anti-inflammatory properties, anti spasmodic and reducing inflammation in the whole respiratory tract.

Seven percentage NaCl solutions are considered mucoactive agents and as such are used to hydrate thick secretions (mucous) in order to make it easier to cough up and out (expectorate). Hypertonic saline solution, by absorbing water from the sub mucosa, can theoretically reverse some of the sub mucosal and adventitial edema and decrease the thickness and dryness of the mucous plaques inside the bronchiolar lumen.[7]

Nebulized hypertonic saline solution reduces pathological changes and decrease airway obstruction and edema. The nebulized hypertonic saline regimens consistently decreases length of hospital stay (LOS) by 0.9 to 1.6 days.

Cilia from airway epithelial cells extend into a periciliary liquid that is coated with an outer mucus layer. The periciliary liquid and mucus layer are known together as the airway surface liquid. The airway surface liquid also contains antibacterial agents, migratory immune system cells, and signaling molecules that help protect against pulmonary infections.

In normal airways, cilia beat at a height just at the interface between the periciliary liquid and the mucus layer, and mucus transport is facilitated when mucus heights are maximized. In laboratory models of the airway surface epithelium, hypertonic saline solutions increase the height of the airway surface liquid and improve mucus transport.

In healthy volunteers, mucociliary transport is improved by nebulized hypertonic saline as well, even producing supra normal rates of mucociliary

clearance. In other words, hypertonic saline may rehydrate the airway surface liquid and restore normal ciliary function.

Global scenario

Chronic respiratory diseases cause approximately 7% of all deaths worldwide and represents 4 % of the global burden of diseases. WHO estimates (2004) currently 235 million people have asthma, 35 million people have pneumonia and 64 million people have chronic obstructive pulmonary disease. Asthma affects 7% of population in the United States.As of 2015 COPD affects about 174.5 million (2.4%) of the global population. More than 3 million people died of chronic obstructive pulmonary disease in 2012, which is equal to 6% of all deaths globally that year and it is estimated to be the third leading cause of death by 2030 More than 90% of all chronic obstructive pulmonary disease death occurs in low and middle income countries.[8]

National scenario

India is experiencing a continued increase in burden of chronic obstructive pulmonary disease (COPD). India is in second place for harboring the most number of morbidity and mortality cases from Obstructive Airway Diseases, after China.It typically occurs in people over the age of 40. Males and females are affected equally commonly. In 2015 it resulted in 3.2 million deaths, up from 2.4 million deaths in 1990.More than 90% of these deaths occur in the developing world. The number of deaths is projected to increase further because of higher smoking rates in the developing world, and an aging population in many countries.[9]

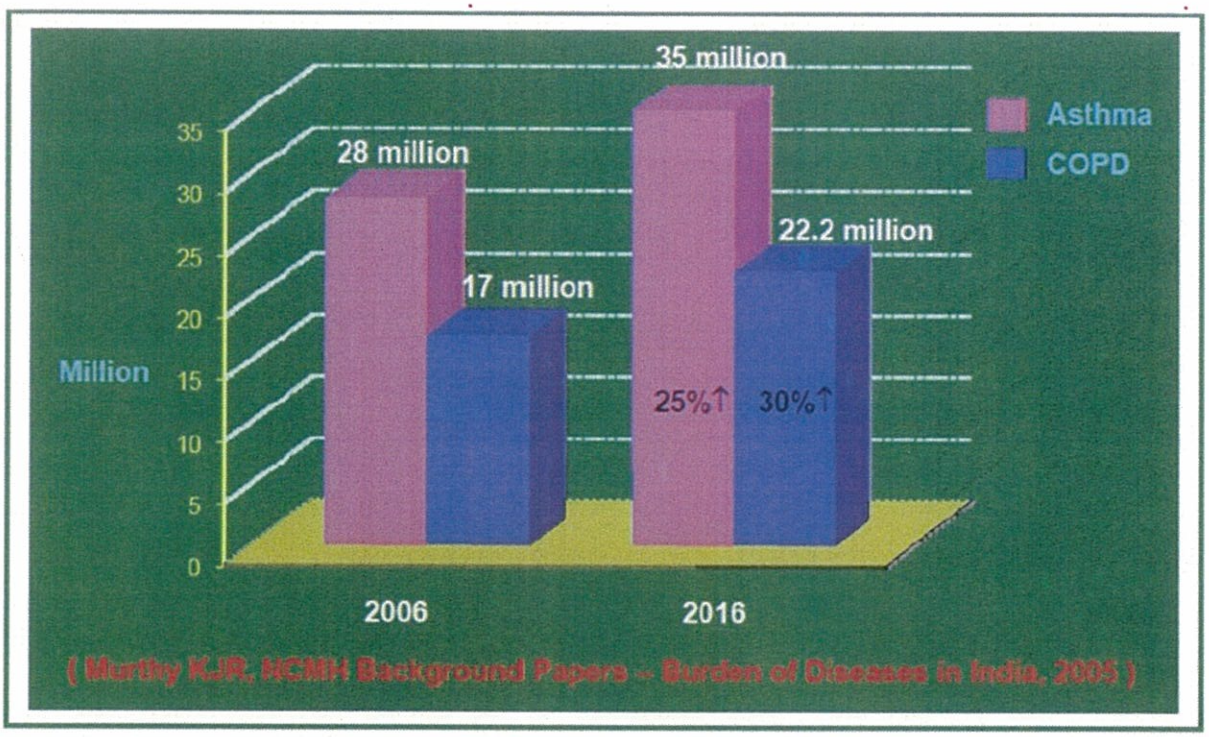


Figure 1.1 Estimated number of cases of COPD in India in the current decade

1.1 Need for the study

Since 2000years ago, Greek medicine had already discovered the practice of topical use of salt for skin lesions, drinking salty or mineralized water for digestive troubles and inhaling salt for respiratory diseases. With advances in technology we know the inflammatory effects of inhaled salt provide relief from respiratory symptoms.[10]

As there is a increasing need for the drug free method to decrease the complications and side effects of drugs and therapy for respiratory diseases, Halotherapy plays a major role in decreasing respiratory symptoms improving the effects of drug therapy and less side effects. Chronic obstructive pulmonary disease,asthma, bronchitis which affects more population which can be managed by Halotherapy.

Action of dry sodium chloride aerosol on respiratory tract:[11]

- Enhancement of respiratory host defenses
- Bacteriostatic effect
- Anti edematous effect
- Enhancement of colonization resistances of epithelial cells
- Enhancement of local immune and biological defense
- Activation of biological defense
- Activation of phagocytes activity
- Activation of ciliated epithelium function

Therefore the investigator while working in a thoracic medicine department realized that the need for adjuvant treatment for respiratory diseases which increases the efficiency of drugs used, so Halotherapy is efficient method to improve the level of airway clearance in patients with mild to moderate airway obstruction. Hence the investigator was interested to conduct a study on effectiveness of Halotherapy on level of airway clearance.

1.2 Statement of the problem;

A study to assess the effectiveness of Halotherapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03.

1.3 Objectives of the study:

1. To assess the symptoms of chronic obstructive pulmonary disease in experimental and control group before administering Halotherapy.
2. To assess the effect of Halotherapy in improving airway clearance in experimental group.
3. To find the effect of Halotherapy in improving airway clearance of experimental by comparing control group.
4. To associate the demographic profile with the post test results.

1.4 Operational definitions:

Effectiveness refers to the improvement in airway clearance after the Halotherapy with 3% hypertonic saline among patients with chronic obstructive pulmonary disease as measured by standardized scales.

Airway clearance refers to clearing the excessive secretions from the bronchial tree after administering 3% hypertonic saline nebulization.

Chronic obstructive pulmonary disease refers to a chronic condition which is characterized by progressive cough, breathlessness, and sputum production and wheezing.

Halotherapy is also known as dry salt therapy or a form of saline solution nebulization . It means breathing a negative ion rich dry salt micro-climate, just like in

natural salt mines. It is a natural safe, non- invasive and alternative therapy which is also very relaxing.

Procedure is a method of administering4 ml of 3 % hypertonic saline nebulization given every 12 hours (2 times per day) for 3 days.

1.5 Assumption:

Halotherapy which uses 3% hypertonic saline for nebulization will considerably improve the airway clearance among the patients with chronic obstructive pulmonary disease.

1.6 Hypothesis:

At p level <0.05

H1: There will be a significant improvement in airway clearance among patients with chronic obstructive pulmonary disease receiving Halotherapy in experimental group than control group.

1.7 Delimitations:

- The study is limited to small sample size
- The period of data collection is 4 weeks

REVIEW OF LITERATURE

CHAPTER –II

REVIEW OF LITERATURE

This chapter deals with 2 parts which includes,

2.1 Review of Literature

2.2 Conceptual framework

Review of literature for the study has been organized under thefollowing headings:

2.1 Review of literaturerelated to the study

This part divides in to 5 sections. It deals with the review of literature related to

2.1.1 Prevalence and incidence of chronic obstructive pulmonary disease

2.1.2 Risk factors of chronic obstructive pulmonary disease

2.1.3 Effects of chronic obstructive pulmonary disease

2.1.4 Prevention of chronic obstructive pulmonary disease

2.1.5 Halotherapy

2.1.1 Prevalence of chronic obstructive pulmonary disease

Sujoy Mukherjee, Goutam Banerjee, Debajyoti Das, and Anil Baran Singha Mahapatra (2017) conducted an observational cross-sectional studyto evaluate the occurrence of COPD in patients having symptoms suggestive of respiratory allergy in fifty urban patients aged 18-60 years (both gender)RGKMCH, Kolkata.Study revealed that 18.97% of non-allergic population was suffering from COPD whereas only 7.69% of allergic subjects had COPD. This difference was statistically highly significant (p=0.0001)[12].

Priscilla Johnson et al (2007), conducted a cross-sectional study among 900 non-smoking women aged above 30 years, from 45 rural villages of Tiruvallur district of Tamilnadu in Southern India in the period between January and May 2007. COPD assessments were done using a combination of clinical examination and spirometry. The study revealed that COPD prevalence was higher in biomass fuel users than the clean fuel users 2.5 vs. 2%, (OR: 1.24; 95% CI: 0.36–6.64) and it was two times higher (3%) in women who spend >2 hours/day in the kitchen involved in cooking[13]

Johnson P Balakrishnan K, Ramaswamy P, Ghosh S, Sadhasivam M, Abirami O, Sathiasekaran BW, Smith KR, et al (2011), conducted a cross-sectional study among 900 non-smoking women aged above 30 years, from 45 rural villages of Tiruvallur district of Tamilnadu in Southern India in the period between January and May 2007. COPD assessments were done using a combination of clinical examination and spirometry, to estimate the prevalence of COPD and its associated factors among non-smoking rural women study was found to be 2.44% (95% CI: 1.43-3.45). COPD prevalence was higher in biomass fuel users than the clean fuel users 2.5 vs. 2%, (OR: 1.24; 95% CI: 0.36-6.64) and it was two times higher (3%) in women who spend >2 hours/day in the kitchen involved in cooking.[14]

2.1.2 Risk factors of chronic obstructive pulmonary disease

Das I, Jagger P, Yeatts K. (2017) conducted a cross-sectional study with the sample of 655 households in Malawi , to identify the biomass cooking fuels and health outcomes forWomen in Malawi.The study results showed that the cooks in rural areas vs. urban areas had significantly higher odds of experiencing health outcomes[15].

Liu Y, Yan S, Poh K, Liu S, Iyioriobhe E, Sterling DA (2016),conducted a This systematic review was to summarize the up-to-date literature on the impact of air pollution on the COPD sufferers by analysing the on articles written in English or with an English abstract. The review showed both short-term and long-term exposures to outdoor air pollution around the world are associated with the mortality and morbidity of COPD sufferers even at levels below the current air quality guidelines. Biomass cooking in low-income countries was clearly associated with COPD morbidity in adult non smoking females[16].

Agrawal S(2012), conducted a comparative study among 99,574 women and 56,742 men aged between 20 and 49 to examine the examined the effect of cooking smoke produced by biomass and solid fuel combustion on the reported prevalence of asthma among adult men and women in India. The results indicate that adult women living in households using biomass and solid fuels have a significantly higher risk of asthma than those living in households using cleaner fuels (OR: 1.26; 95%CI: 1.06-1.49; p = .010)[17].

Liu S, Zhou Y, Wang X, Wang D, Lu J, Zheng J, et al(2007), conducted a cluster disproportional random sampling survey to investigate the prevalence of COPD in two study communities in Guangdong province in China and to measure the association between COPD and indoor biomass fuel air pollution. The analysis showed a significant association between COPD and exposure to biomass fuel for cooking[18]

Kiraz K, Kart L, Demir R, Oymak S, Gulmez I, Unalacak M et al(2003), conducted a study to evaluate the frequencies of chronic obstructive pulmonary disease (COPD) and chronic bronchitis (CB) among rural women using biomass fuels for heating and cooking and compared them to women living in urban areas where such fuels are not used. The samples are selected 242 women living in rural areas near Kayseri, Turkey and 102 women living in apartments in the city having central heating and cooking with fuels other than biomass ones. The study results showed that rural women exposed to biomass fumes are more likely to suffer from CB and COPD than urban women even though the prevalence of smoking is higher among the latter group[19].

Ostiguy G, Vaillancourt C et al (1995), conducted a study to assess the airflow limitation in workers exposed to long term metal dust, the prevalence of pleural plaques in the workers exposed to asbestos in the past, the influence of pleural plaques on lung function and the possible association with the airway disease caused by asbestos. The study revealed that the low level long term exposure to metal dusts, gases and foundry fumes do not necessarily cause respiratory dysfunction.[20]

2.1.3 Effects of chronic obstructive pulmonary disease

Ruan W, Wu M et al (2017) conducted a study among 25 patients of experimental group and 25 in control group, to explore the insulin-like growth factor binding protein 7 (IGFBP 7) level in the serum of chronic obstructive pulmonary disease patients during acute exacerbation. The study revealed that serum IGFBP7 level raised during acute exacerbation of COPD and the levels reduced after convalescence and concluded that IGFBP7 as a biomarker of AECOPD.[21]

Banerjee S, Bhattacharyya P et al (2017),conducted a study, to compare the serum anti –p-BQ (Benzo Quinone) antibody level between smokers with and without COPD . The study revealed that the serum anti p-BQ antibody level may be used as biomarker to identify the asymptomatic smokers at risk for chronic obstructive pulmonary disease[22].

Hurst JR, Wilkinson TM, Donaldson GC, Wedzicha JA (2004), conducted a study among 65 patients with moderate to severe COPD, to assess the impact on quality of life from upper airway symptoms in chronic obstructive pulmonary disease .The 20- item Sino – Nasal Outcome Test (SNOT -20) and St. George's Respiratory Questionnaire (SGRQ) are used as an assessment tools. The study revealed that upper and lower airway symptoms contributing to the total quality of life burden[23]

Hens G, Vanaudenaerde BM, Bullens DM, Piessens M, Decramer M, Dupont L J et al (2009), among ninety patients with stable bronchial disease were included in the study, of which 35 were diagnosed with allergic asthma, 24 with non allergic asthma and 31 with COPD to identify the Sinonasal pathology in non-allergic asthma and COPD: 'united airway disease' beyond the scope of allergy. The study results showed that Patients with allergic and non- allergic asthma and COPD show increased nasal symptoms and more nasal inflammation. Hence, our data confirm the 'united airways' concept to be beyond the scope of allergic asthma[24]

2.1.4 Prevention of chronic obstructive pulmonary disease

Stead LF, Lancaster T. (2016), conducted a randomized or quasi-randomized controlled trials to evaluate combinations of pharmacotherapy and behavioural support for smoking cessation, compared to a control receiving usual care or brief advice or less intensive behavioural support. The study results showed .The study results showed that (15,021 participants) there was good evidence for a benefit of combination pharmacotherapy and behavioural treatment compared to usual care or brief advice[25]

Zakrisson AB, Engfeldt P, Hägglund D, Odencrants S, Hasselgren M, Arne M et al(2013), conducted 1-year longitudinal study with a quasi-experimental design was undertaken in patients with COPD, 49 in the intervention group and 54 in the control group to investigate the effects of a nurse-led multidisciplinary programme (NMP)of pulmonary rehabilitation in primary health care with regard to functional capacity, quality of life (QOL) , and exacerbations

among patients with chronic obstructive pulmonary disease. The study revealed that the NMP in primary care produced a significant reduction in exacerbation frequency, but functional capacity and QoL were unchanged[26].

Rigotti NA, Munafo MR, Stead LF(2007),conducted a randomized and quasi-randomized trials of behavioural, pharmacological or multicomponent interventions to help patients stop smoking, conducted with hospitalised patients who were current smokers or recent quitters, to determine the effectiveness of interventions for smoking cessation that are initiated for hospitalised patients. The study showed that the high intensity behavioural interventions that begin during a hospital stay and include at least one month of supportive contact after discharge promote smoking cessation among hospitalised patients[27].

2.1.5 Reviews related to Halotherapy

Halotherapy which stimulates a natural salt cave micro climate. The treatment in the natural salt caves (Speleotherapy) has been known since ancient time.

Indications for use:

To relieve the symptoms of the following conditions

- Chronic obstructive pulmonary disease
- Cold
- Chronic wheezing
- Pneumonia after acute stagemucosal edema
- Chronic bronchitis
- Rhinitis

Mechanism of action

The main effective factor is a curative breathing environment which is saturated with dry sodium chloride aerosol at a mass concentration varying from 1-16 mg/m3 with a particle size of 1-5 um. Dry sodium chloride aerosol has a negative charge of the particles. The inner surface of airway has positive charges. Negatively charged particles of the dry sodium chloride aerosol move into lumen of the respiratory tract and settle intensively compared to neutral particles.

Rabbani.B, Makki.SS et al (2013), conducted a clinical trial to evaluate the results of spirometry and 6-minute walk test as well as the quality of life (according to SF-36 questionnaire) of stable non-CF bronchiectatic patients presenting to the pulmonary clinic before and after the use of salt spray for 2 months. Of 40 study patients, 20 were excluded due to various reasons and 20 were evaluated. The mean age of patients was 35±11 years and the underlying cause of disease was chronic pulmonary infection in 65% of cases. Comparison of the results of pulmonary function tests and 6-minute walk test and quality of life indices in SF-36 questionnaire before and after the intervention showed no significant difference ($P > 0.05$). However, 65% of patients were satisfied with halotherapy and requested to receive the medication again.[28]

Cernomaz TA, Bolog SG (2007) conducted a study to evaluate the effects of 5a dry salt inhaler in adults with COPD. All 35 clients were under correct treatment according to GOLD guidelines for at least two weeks to the start of the study. The clients were given dry salt inhalers and were asked to use them up to 30 minutes per day. Spirometry tests and six minutes walks test were performed initially and after one, two and three months, results showed that dry salt inhaler therapy proved to be a useful adjuvant therapy in COPD.[29]

Gorbenko PP, Adamova IV, (2007) conducted a study on bronchial hyper reactivity to the inhalation of hypo and hyper osmolar aerosols and its correction by halotherapy in patient with asthma. Clinical efficacy of halotherapy and initial

bronchial hyper reactivity to ultrasonic inhalations of purified water correlated (r= 0.56: p>0.05).[30]

Hedman .J, et al (2006) conducted a study on effect of salt chamber treatment on bronchial hyper responsiveness in asthmatics. Clinical controlled trial used with either another type of intervention or no intervention. Total of 124 clients were selected. Results showed that after 3 weeks of treatment by salt chamber reduces the bronchial hyper responsiveness as an add-on therapy in asthmatics with low to moderate dose of inhaled steroids. The possibility that salt treatment could serve as a compensatory therapy to conventional medication cannot be excluded.[31]

Wark PAB, Mc Donald V (2004) conducted a study to determine the improvement of lung function ,exercise tolerance after the halotherapy in patient with cystic fibrosis. Selection criteria based on all control trails that assessed the effect of hypertonic saline compared to placebo or other mucolytic therapy. Results showed that nebulized hypertonic saline improves mucocilliary clearance immediately after administration which may have a longer term beneficial effect in cystic fibrosis.[32]

AbdrakhmanovaLM ,et al (2004) conducted a study to assess the effectiveness of halotherapy on chronic bronchitis clients. The chemo luminescence test in 49 clients with chronic inflammatory bronchitis has revealed inhibition of generation of active oxygen forms in the whole blood intensification of lipid per oxidation in the serum, depression of local immunity .Administration of halotherapy to the above clients results in correction of disturbances of free radical oxidation, improves local immunity and clinical course of the study.[33]

Tano L, Tano K. (2004) conducted a study to assess the daily spray with saline prevents symptoms of rhinitis by experimental design. This study involving 10 weeks of daily saline nasal spray and 10weeks of only recording symptoms 108 healthy conscripts aged approximately 20 years. Data were recorded by the participants in a diary at home. A total of 69 subjectscompletedthe 20 week diary period. During the spray period the number of days with nasal secretion and blocked nose (mean 6.4 days) was significantly (p=0.027) lower than that during the

observation. Results showed daily nasal spray with saline can prevent nasal symptoms of common cold in a population of otherwise healthy adults.[34]

ValeiaBurzuk E,(2003) conducted a study on the effectiveness of salt pipe on chronic bronchitis ,asthma ,COPD. Investigator selected 10 clients among which 3 of them suffered from chronic bronchitis ,6 of them asthma ,1 is COPD. Clients used salt pipe in the period starting in October 2002, finished February 2003,for 2-3 month of duration .The investigation found that salt is very effective, comprehensive tool in the therapy of clients with respiratory problem. The secretion discharge was easier ,so the breathing of the patient is improved.[35]

Daviskas .E,S.D Anderson et al (2002) conducted a study on the effectiveness of mucocilliary clearance in asthmatic and healthy subjects selected. Ultrasonically nebulised 14.4 % saline and ultrasonically 0.9% saline. The airway response to 14.4% saline was high (44+_ 14%) compared to 0.9% saline (39+_ 13%).They conclude that an increase in osmolarity of the airway surface liquid increases mucocilliary clearance both in asthmatic and healthy subjects.[36]

Cherniav AL, Kvetnaia AS et al (2002), conducted a study to assess the efficacy of dry high-dispersive aerosol of sodium chloride – the main acting factor of halo aerosol therapy on defense system of the respiratory tract among 188 patients with respiratory disease and risk of pulmonary pathology received halo aerosol therapy and 49 matched patients received placebo. The study revealed that halo aerosol therapy has positive effect on the defence system, improves functions of the respiratory tract.[37]

Beamon S.Falkenbach A. (2001) conducted a study on halotherapy for asthma. It includes controlled clinical trials in which the investigator compared clinical effects of halotherapy with another intervention or no intervention in clients with chronic asthma. Results showed that two trials reported that halotherapy had beneficial short term effect on lung function.[38]

Blake Papsin , et al (2001) conducted the study on the efficacy of saline nasal irrigation for treatment of sinusoidal conditions and to explore its potential benefits. Flushing the nasal cavity with hypertonic saline promotes mucocilliary clearance by moisturizing the nasal cavity and by encrusted materials .Researcher concluded that nasal irrigation is a simple inexpensive treatment that relieves the symptoms of a variety of sinus and nasal conditions ,reduces the use of medical resources ,and could help to minimise the antibiotic resistance.[39]

Chervinskaya AV, Zilber NA et al (2000), conducted a study to evaluate the effects of halotherapy in 124 patients with various types of respiratory diseases. The control group received placebo. The study revealed that there is positive dynamics of flow volume loop parameters and decrease in bronchial resistance and there is no significant improvement in control group.[40]

EmeseFazekas, (1998) conducted a study on the effect of speleotherapy by observational approach. Findings showed that 77% of clients felt better relief 4 hours of underground treatment 22.7 % of clients felt the same while 0.3 % of clients felt worse than outside. The necessity of hospitalization in the territorial hospitals decreased in 73% of cases comparing to precedent years, for 24% was the same and for 3% the hospitalization was frequent.[41]

Richard Zagrabelay(1998), conducted a study on effectiveness of halotherapy in asthma, allergy and other respiratory diseases. Experiments showed that cilia of the trachea or wind pipes are stimulated by negative ions and depressed by positive ions.Human cilia are microscopic hairs that maintain whip like motion while cleansing the air and inhale of dust and pollen and other matter that should not reach the lungs.[42]

ChernenkovRA ,et al (1997) conducted a study on the use of artificial micro climate chamber in the treatment of clients with bronchitis and asthma . Halotherapy was used for sanatorium rehabilitation in 24 clients with chronic bronchitis and asthma .Significant effects of this method resulted in improvement of the flow parameter curve of lung.[43]

Borisenkolv,et al (1995) conducted a study to assess the use of halotherapy for the rehabilitation of clients with acute bronchitis using controlled trails. Halotherapy was used for rehabilitation in 25 clients with acute bronchitis. The important therapeutic action was ensured by aero dispersed medium saturated with dry sodium chloride aerosol. The assessment was done by functional, immunological , and microbiological findings. Results showed favourable changes in metabolic activity, marked decreases of unbalance in lipid per oxidation and antioxidant system.[44]

2.2 Conceptual Framework

The Study based on Modified Wiedenbach's (1964) helping art of clinical nursing theory

Wiedenbach's prescriptive theory is based on three factors[45]:

- The central purpose which the practitioner recognizes as essential to the particular discipline.
- The prescription for the fulfilment of central purpose.
- The realities in the immediate situation that influence the central purpose

1. Central purpose

Purpose refers to what the nurse wants to accomplish. It is the overall goal towards which a nurse strives. It is based on the nurse's personal philosophy. Nurse researcher wants to assess the airway clearance before and after halotherapy.

2.Prescription

Prescription refers to the plan of care for a patient. It specifies the nature of the action that will fulfill the nurse's central purpose. Here the experimental group receives halotherapy along with treatment prescribed by physician, but the control group receives the treatment prescribed by physician only.

3. Realities

Realities refer to the physician, physiological, emotional that come into play in a situations involving nursing action. The five realities identified by Weidenbach are agent, recipient, goal, means and framework.

a. **Agent** : Nurse researcher

b. **Recipient**: Patients having chronic obstructive pulmonary disease

c. **Goal** : To improve the level of airway clearance

d. **Means** : Administration of halotherapy (3% NS 4ml-nebulization)

e. **Framework** : Selected wards (Male and Female medical wards in selected wards in Rajiv Gandhi Government General Hospital, Chennai -03)

Nursing Practice:

a. **Identification:**

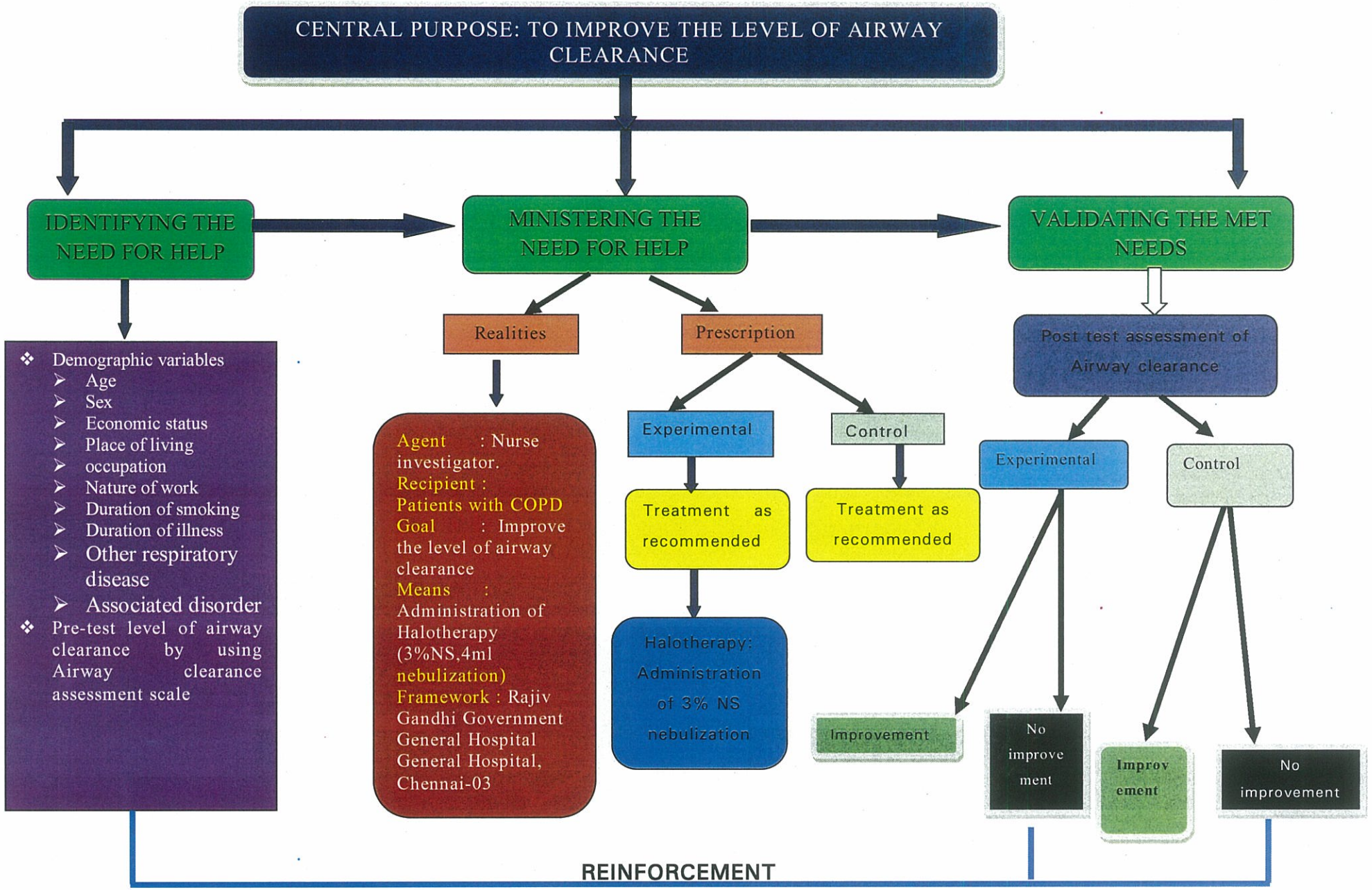
Involves viewing the patient as an individual, with unique experience and understand the patient's perception of the condition, determine a patients need for help based on the exercise. Here the patient was assessed before halotherapy. Level of clearance is assessed by respiratory assessment scale which includes respiratory rate, auscultation findings, dyspnea score and oxygen saturation level.

b. **Ministration:**

Refers to provision of needed help. Based on the level of airway clearance the halotherapy was administered.

c. **Validation:**

Refers to collection of evidence that shows an ability of patient's need has been met and that functional ability has been restored as a direct result of the nurses action. In validation post assessment was done after halotherapy (3% NS 4 ml Nebulization).



MODIFIED WIEDENBACH'S HELPING ART OF CLINICAL NURSING THEORY(1964)

RESEARCH METHODOLOGY

CHAPTER –III

RESEARCH METHODOLOGY

This chapter deals with research methodology followed to assess the effectiveness of Halotherapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03.

Research methodology is a pathway by which the researcher intended to solve the research problems systematically. It involves the series of procedures in which the investigator starts from initial identification of the problem to its final conclusion.[47]

3.1 Research Approach

Quantitative research approach

3.2 Research Design

The researcher adopted quasi experimental research design-Non randomized control group design

Description of design Quasi experimental design

Groups	Pre-test	Intervention	Post-test
Experimental Group (E)	E_1	X	E_2
Control Group (C)	C_1	–	C_2

Notes :

E - Experimental Group

E_1 - Experimental Group Pre-test

E_2 - Experimental Group Post-test

X - Intervention

C - Control Group

C_1 - Control Group Pre-test

C_2 - Control Group Post-test

3.3 Study Setting

The study was conducted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03.It is one of the biggest hospital in South East Asia with 3100 beds and has all the specialties and super specialties

3.4 Duration of the study

The study was conducted for the period of 4 weeks from 20.11.16 to 18.12.16

3.5 Study population

Patients with chronic obstructive pulmonary disease who met inclusion criteria.

3.5.1 General population

Patients who are admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai.03

3.5.2 Target population

Patients who got admitted with chronic obstructive pulmonary disease in selected wards in Rajiv Gandhi Government General Hospital, Chennai.03 and who fulfills the inclusion criteria of sample selection.

3.5.3Accessible Population:

Comprises of both male and female patients with chronic obstructive pulmonary disease admitted in selected wards who fulfills the inclusion criteria of sample selection and who are available during the period of data collection.

3.6 Study sample

Comprised of patients with chronic obstructive pulmonary disease who met the inclusion criteria.

3.7 Sample Size

60 Samples of male and female patients with chronic obstructive pulmonary disease. 30 –experimental group, 30 – control group.

3.8 Sampling Criterion

3.8.1Inclusion Criteria

1. Men and women who are willing to participate in study.
2. Men and women who are available during the period of data collection.
3. Men and women who are able to read English and /or Tamil.
4. Men and women who are having the symptoms of chronic obstructive pulmonary disease such as increased respiratory rate, wheezing, cough, and sputum production.

3.8.2 Exclusion Criteria

1. Patients with lung and cardiac insufficiency and hypertension.
2. Patients who are acutely ill.

3.9 Sampling Technique

Convenient sampling technique.

3.10 Research Variables

3.10.1 Dependent variables

Airway clearance in patients with chronic obstructive pulmonary disease

3.10.2 Independent variables

Halotherapy by 3% hypertonic saline nebulization

3.11 Development and Description of the tool

3.11.1 Development of the tool

The investigator developed the tool for the study on basis of objectives of the study. After an extensive review of literature and discussion with the experts in the department of medicine regarding the administration of Halotherapy.

3.11.2 Description of the tool

The tool consists of two section which is described as followed

Section A - Consists of demographic variables (age, sex,economic status, place of living, occupation, nature of work, duration of smoking, duration of illness, other respiratory disease and associated disorder)

Section B –Consists of airway clearance assessment scale which consists of respiratory rate, auscultation findings of lungs, modified saturation scale and modified research council dyspnea scale

3.11.3 Score Interpretation

Scoring is based on Airway clearance assessment scale.

Adequate - 0 to 4

Moderately adequate - 5 to 9

Inadequate - 10 to 17

Halotherapy Procedure

Assessing the patient's symptoms by using airway clearance assessment scale which include respiratory rate, auscultation findings, saturation level, modified dyspnea scale. Scoring was done. 3% (NS) hypertonic saline nebulization given for 10 -20 minutes for 3 days. After 3 days the patient is assessed for the symptoms by using same airway clearance assessment scale. Both the score pre-test and post-test score were entered daily in the coding sheet.

3.11.4 Intervention Protocol

Details	Experimental group	Control group
Place	Male and female medical wards in RGGGH	Male and female medical wards in RGGGH
Therapy	Halotherapy	Routine care
Duration	10-20 minutes	-
Frequency	3 days	-
Time	Morning and evening	-
Who	Investigator	Investigator
Whom	Patients with chronic obstructive pulmonary disease	Patients with chronic obstructive pulmonary disease
Where	Male and female medical wards	Male and female medical wards
How	By using nebulizer	-

3.12 Content validity of the tool

The content validity of the tool was obtained from nursing and medical experts and their corrections and suggestions were incorporated in the tool. The recommendation was some changes in the demographic profile and in the airway clearance assessment scale and its scoring. Recommendation incorporated in the study.

3.13 Reliability of the tool

The pilot study revealed the reliability of the tool which is assessed by using inter rater method and its correlation coefficient r –value was 0.83 which reveals the tool was highly reliable. The pilot study also predicted the practicability and feasibility of the study

3.14Ethical considerations

The following submission of study proposal the permission was obtained fromInstitutional Ethics Committee. The permission for conducting the study was obtained fromthe Director of Internal Medicine. Formal written consentwas obtained from each study participants before starting the data collection. Confidentiality of the results and anonymity were assured to the participants. Assurance that they can withdraw from the study at any time was given to them.

3.15 Pilot study

The pilot study was conducted among patients with chronic obstructive pulmonary disease, 5 samples in experimental group and 5 samples in control group were studied. The purpose of the study was explained to the subjects and informed consent was taken prior to data collection. Data was collected using prepared tools. The pilot study samples were excluded from main study.

3.16 Data collection procedure

Formal permission was form from the Director of internal medicine. The investigator selected the samples from the male and female medical wards. They were assured that the collected information will be kept confidential.The data was collected from 21.11.16to18.12.16.at 7 am onwards. The pilot study samples are excluded from main study samples.Self-introduction was made to the patient, explained the benefits of therapy and scope of the study. Approximately3 to 4 participants were selected per day. The investigator explained the procedure to the participants and obtained informed written consent. Information about the patients with chronic obstructive pulmonary disease collected by demographic profile.Confidentiality of the results and

anonymity were assured to the participants. Assurance was given to them that they can withdraw from the study at any time The symptoms of the participants were assessed by using Airway clearance assessment scale. Routine care given to both the group. Intervention (Halotherapy – 3%hypertonic saline nebulization) given to experimental group only. Post test conducted on both the group after 3 days of intervention. Meanwhile the investigator clarified the patient's doubts.Modified tool was used to assess the level of airway clearance.

3.17 Data entry and Data analysis

3.17.1 Data entry

- After data collection, data entered in the coding sheet every day.
- SPSS application is used foe data entry.

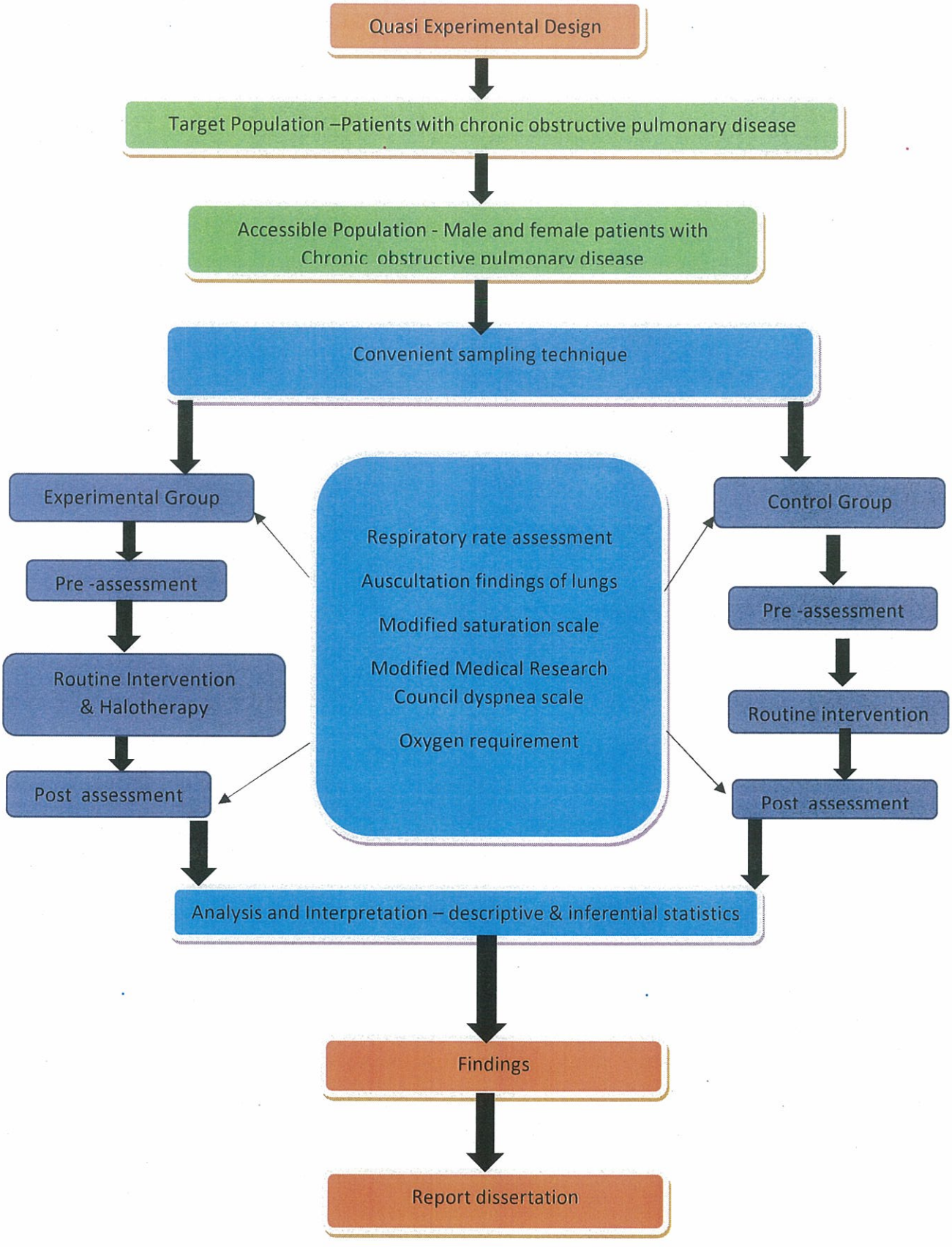
3.17.2 Data analysis

The data were analyzed using both the descriptive and inferential statistics on the basis of the objectives and hypothesis of the study.

- Demographic variables in categorical/dichotomous was analyzed in frequencies with their percentages.
- Symptoms score was analyzed in mean and standard deviation.
- Difference between experiment and control was analyzed using student independent t-test.
- Difference between pretest and posttest was analyzed using student paired t-test.
- Statistical significant difference between pre and post -test level of symptoms score was analyzed using extended McNemar's test.
- Homogeneity between experiment and control group demographic variables are analysed using chi square test.

- Association between level of symptoms score with demographic variables are analysed using chi square test.
- Differences between pretest and posttest difference on effectiveness of study was analysed using percentage with 95% CI and mean difference with 95% CI.
- Association between symptoms reduction score and Demographic variables was analysed using Oneway ANOVA F-test and student independent t-test.

Figure -3.1Schematic representation of research methodology



DATA ANALYSIS AND INTERPRETATION

CHAPTER- IV

DATA ANALYSIS AND INTERPRETATION

This chapter deals with the analysis and interpretation of data to assess the effectiveness of halotherapy in airway clearance among patients with chronic obstructive pulmonary disease in selected wards at Rajiv Gandhi Government General Hospital, Chennai-03. Data collected were tabulated and analysed using descriptive and inferential statistical methods.

Organization of Data:

Section A : Distribution of demographic variables of study participants

Section B: Assessment of the symptoms of chronic obstructive pulmonary disease in experimental and control group before administering halo therapy

Section C: Assessment of the effect of halotherapy in improving airway clearance in experimental group as post test.

Section D: Comparison of the effect of halotherapy in improving airway clearance of Experimental group and Control group

Section E : Association of post test level of airway clearance with the selected demographic variables in the experimental and control group

Section: A Distribution of demographic variables of study participants

Table 4.1:Frequency and percentage distribution of study participants based on demographic Profile

Demographic variables		Group				Chi square test
		Experiment(n=30)		Control(n=30)		
		N	%	N	%	
AGE	21 -30 years	0	0.0%	0	0.0%	$\chi2$=1.35 P=0.51 DF=3 NS
	31 -40 years	5	16.7%	8	26.6%	
	41 -50 years	10	33.3%	11	36.7%	
	51 -60 years	15	50.0%	11	36.7%	
SEX	Male	24	80.0%	22	73.3%	$\chi2$=0.37 P=0.54 DF=1 NS
	Female	6	20.0%	8	26.7%	
ECONOMIC STATUS	Lower class	5	16.7%	3	10.0%	$\chi2$=0.57 P=0.44 DF=2 NS
	Middle class	25	83.3%	27	90.0%	
	Upper class	0	0.0%	0	0.0%	
PLACE OF LIVING	Urban	12	40.0%	14	46.6%	$\chi2$=0.64 P=0.88 DF=3 NS
	Rural	8	26.7%	6	20.0%	
	Industrial area	6	20.0%	5	16.7%	
	Near to cotton industry	4	13.3%	5	16.7%	
OCCUPATION	Sedentary	7	23.3%	5	16.7%	$\chi2$=0.42 P=0.80 DF=2 NS
	Moderate Worker	15	50.0%	16	53.3%	
	Heavy Worker	8	26.7%	9	30.0%	
NATURE OF WORK	Cotton industry	4	13.3%	5	16.6%	$\chi2$=0.31 P=0.98 DF=4 NS
	Cement Industry	2	6.7%	2	6.7%	
	Coal mines	1	3.3%	1	3.3%	
	Sugar cane industry	3	10.0%	2	6.7%	
	None of the above	20	66.7%	20	66.7%	
DURATION OF SMOKING	1-2 years	2	6.7%	2	6.7%	$\chi2$=2.31 P=0.67 DF=4 NS
	2-3 years	3	10.0%	2	6.7%	
	3-4 years	5	16.6%	10	33.3%	
	More than 5 years	15	50.0%	12	40.0%	
	Nil	5	16.7%	4	13.3%	
DURATION OF ILLNESS	1 Year	4	13.3%	3	10.0%	$\chi2$=1.14 P=0.76 DF=3 NS
	1-2 Year	13	43.4%	10	33.4%	
	2-3 years	6	20.0%	7	23.3%	
	Above 3 years	7	23.3%	10	33.3%	
OTHER RESPIRATORY DISEASE	Tuberculosis	5	16.7%	6	20.0%	$\chi2$=1.89 P=0.59 DF=3 NS
	Bronchial asthma	6	20.0%	10	33.3%	
	Pneumonia	1	3.3%	1	3.3%	
	No other respiratory diseases	18	60.0%	13	43.4%	
COMORBID ILLNESS	Diabetes mellitus	9	30.0%	10	33.3%	$\chi2$=0.08 P=0.78 DF=3 NS
	Stroke	0	0.0%	0	0.0%	
	Cardio Vascular Disease	0	0.0%	0	0.0%	
	No Other disorders	21	70.0%	20	66.7%	

Findings of demographic variables:

Table 4.1.shows the demographic information of COPD patients those who are participated in the following study on "A study to assess the effectiveness of Halotherapy in improving airway clearance among patients with Chronic Obstructive Pulmonary Disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03."

Among the participants 50.0% majority of them (Experimental – 50.0%, Control- 36.7%) are between 51- 60 years, about 33.3% in experimental and 36.7 % in control group, 16.7 % in Experimental and 26.6% in Control group are between 31-40 years and no one is between the age group of 21-30 years in both the Experimental and Control group.

According to the table it shows that males are commonly affected in Experimental - 80.0% and Control -73.3% where as Females in Experimental 20.0% , Control group-26.7%.

According to the economic status the middle class people are commonly affected with chronic obstructive pulmonary disease. It is about 83.3% in Experimental group and 90.0% in Control group.

In both the group most of the affected people are from Urban areas, in Experimental -40.0% and in Control -46.6% than rural and industrial areas.

In occupation about 50.0% in Experimental and 53.3% in Control group are doing moderate work , 23.3% and 16.7% from sedentary worker in experimental and control group respectively.

According to nature of work the same percentage of 66.7% in both the group are not working in cotton ,cement, coal mine and sugar cane industry.

In duration of smoking, non smokers are only 16.7% in Experimental and 13.3% in Control group whereas the people who smoke more than 5 years are about 50.0% in Experimental and 40.0% in Control group.

The highest duration of illness in both the group is 1-2 years, it is about 43.4% and 33.4% in Experimental and Control group respectively.

Compared to other respiratory diseases, Bronchial asthma lies at 20.0% and 33.3% in Experimental and Control group respectively in the study population.

30.0% of Experimental and 33.3% of Control group have diabetes mellitus and none of them have stroke or cardio vascular disease.

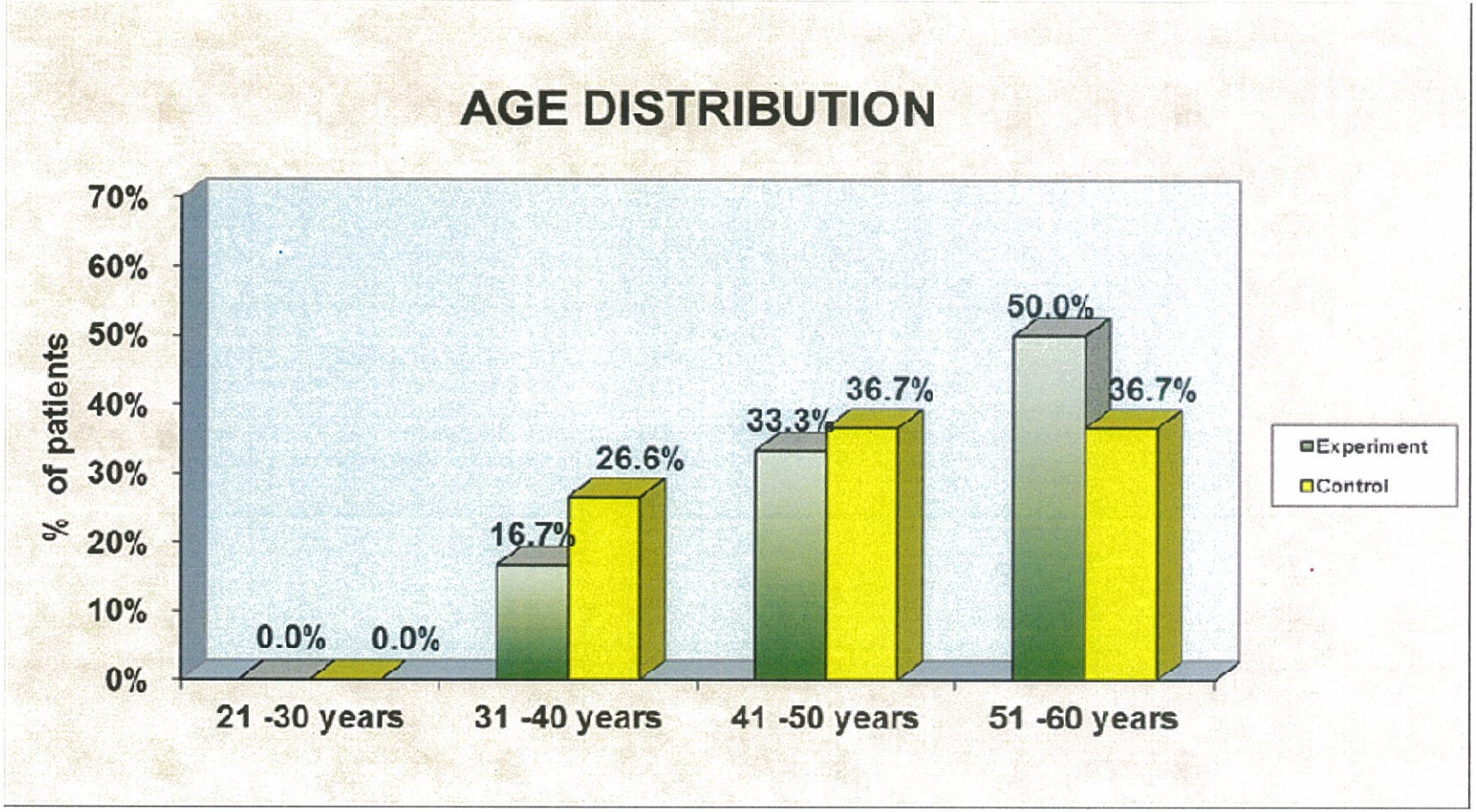


Figure 4.1 Age wise distribution of study participants

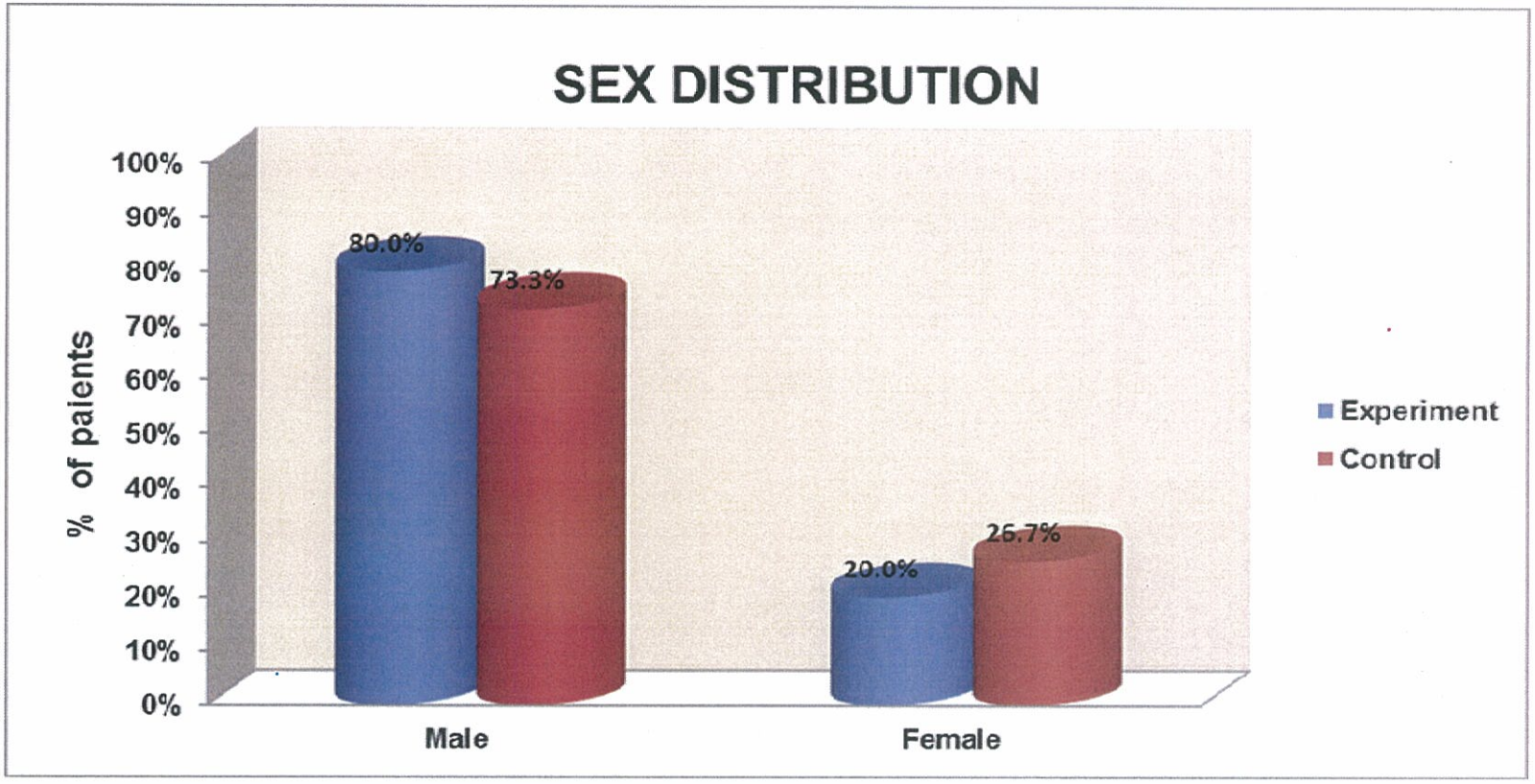


Figure 4.2 Gender wise distribution of study participants

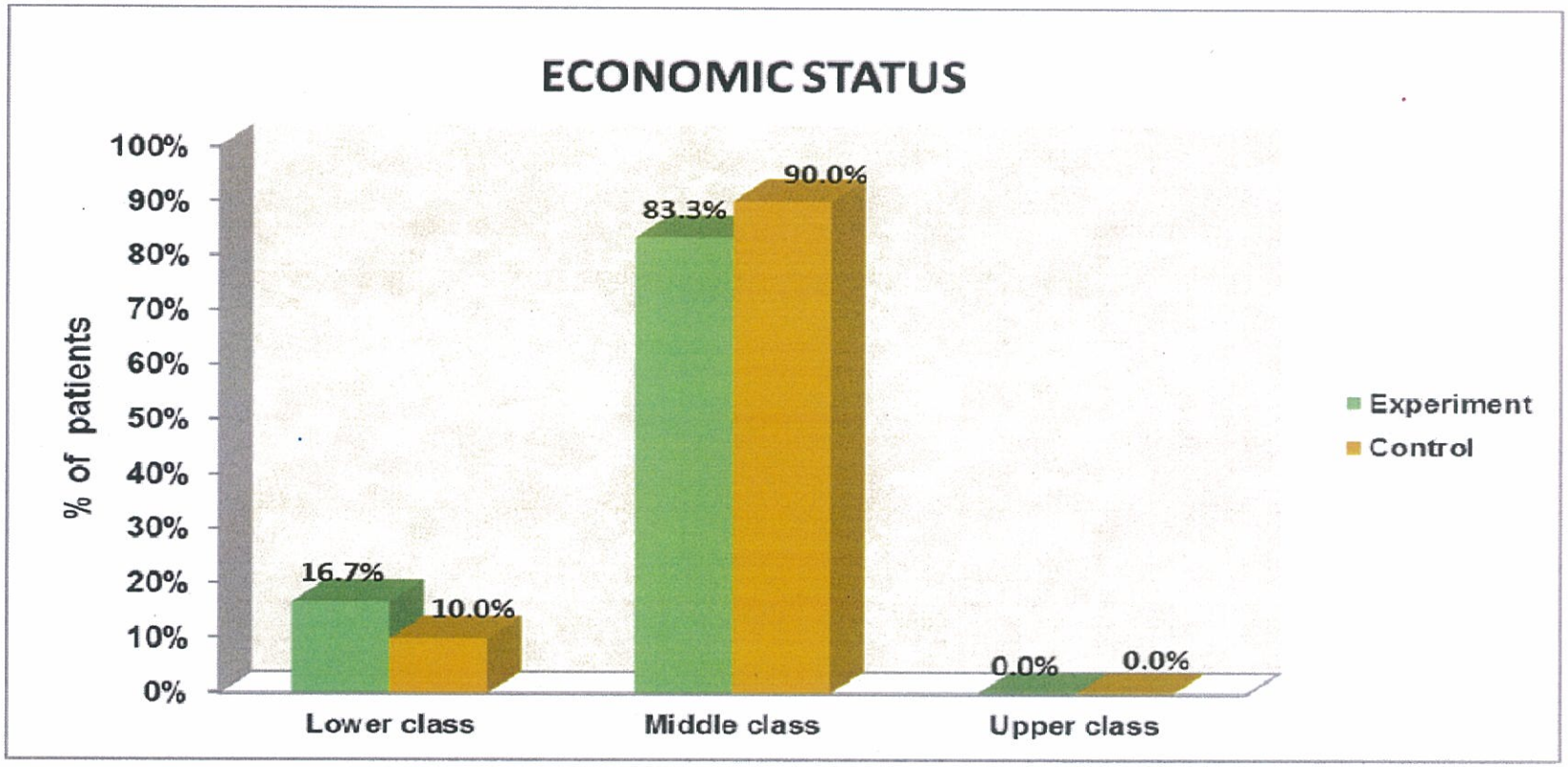


Figure 4.3 Distribution of economic status of study participants

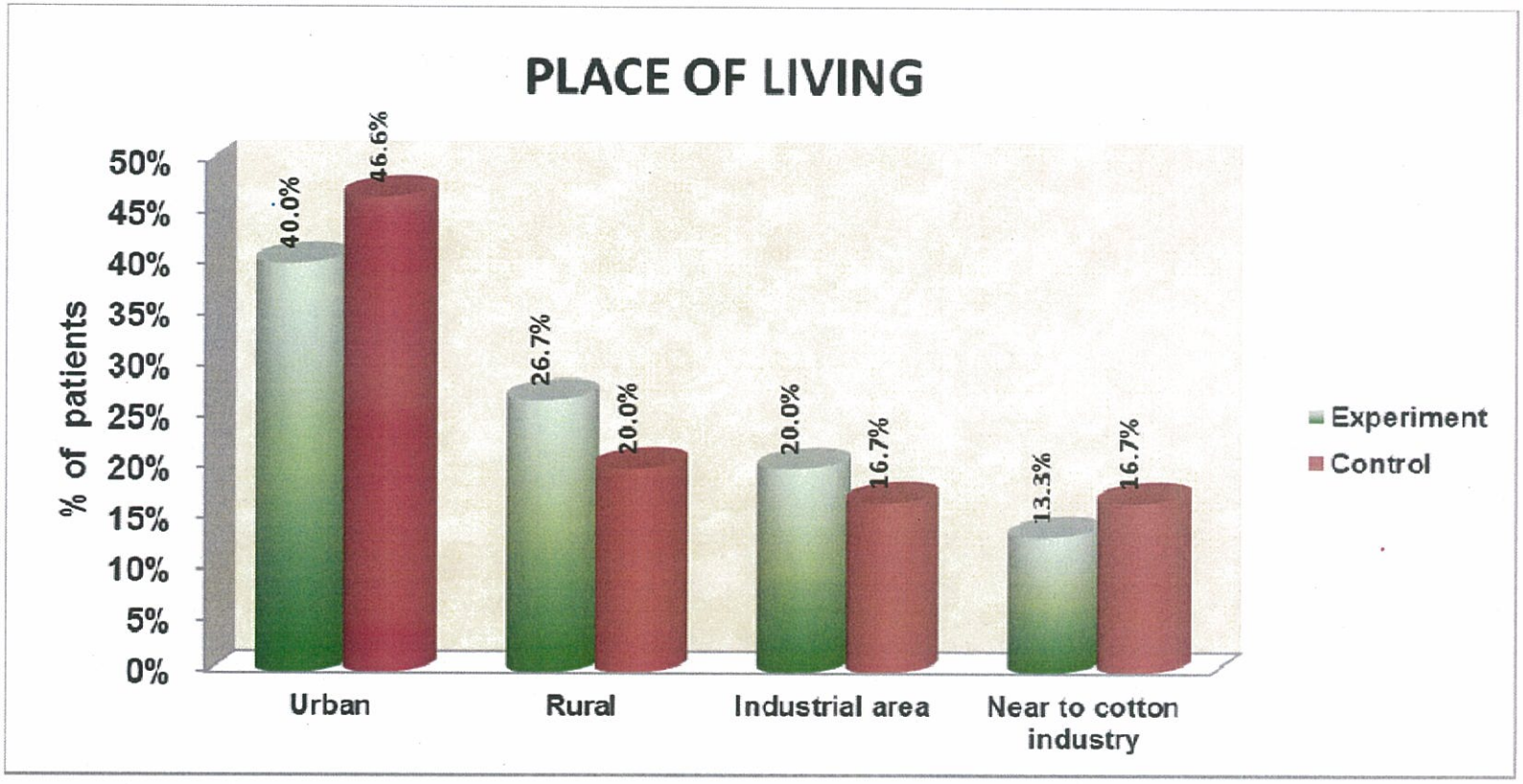


Figure 4.4 Distribution of place of living of study participants

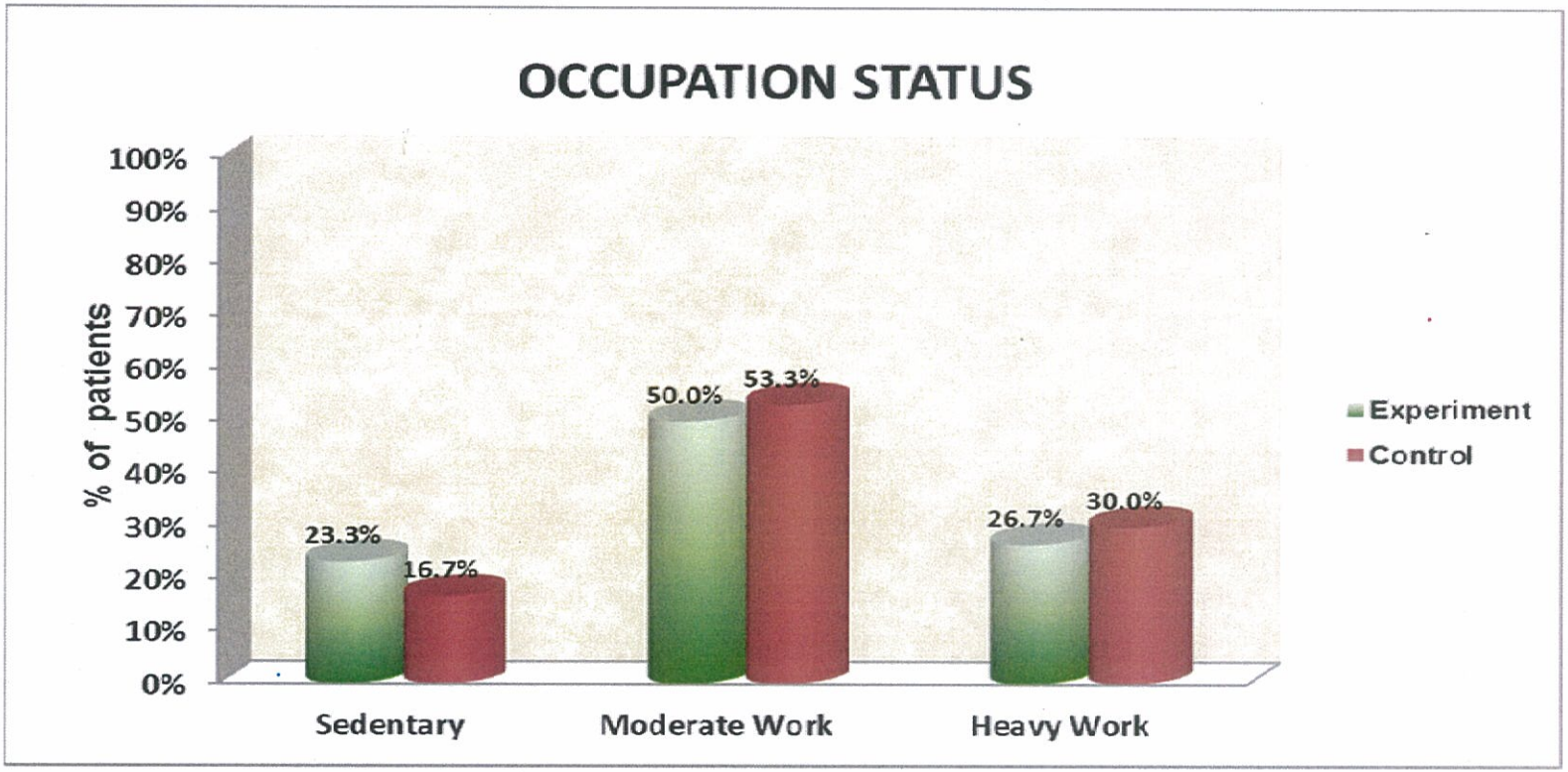


Figure 4.5Distribution of occupationstatus of study participants

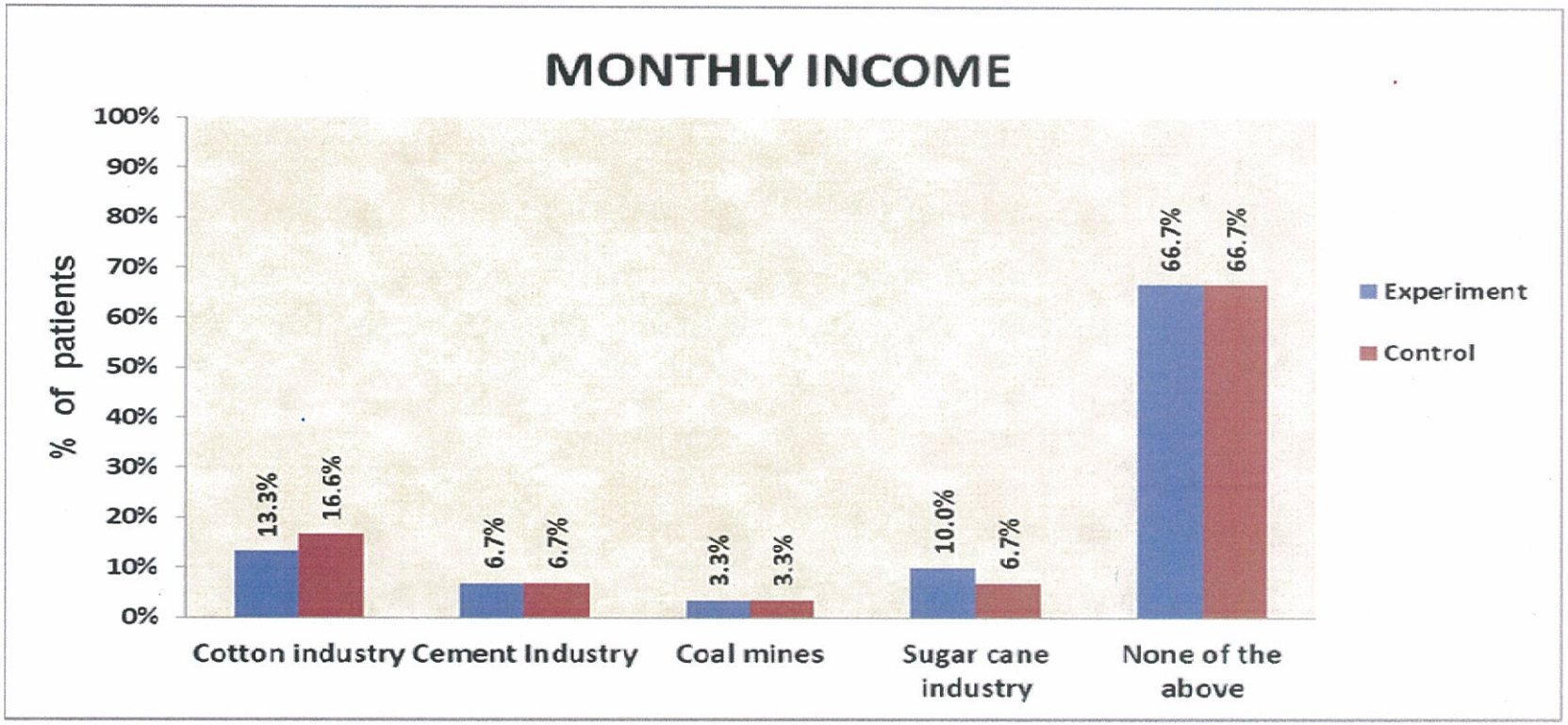


Figure 4.6 Distribution of monthly income of study participants

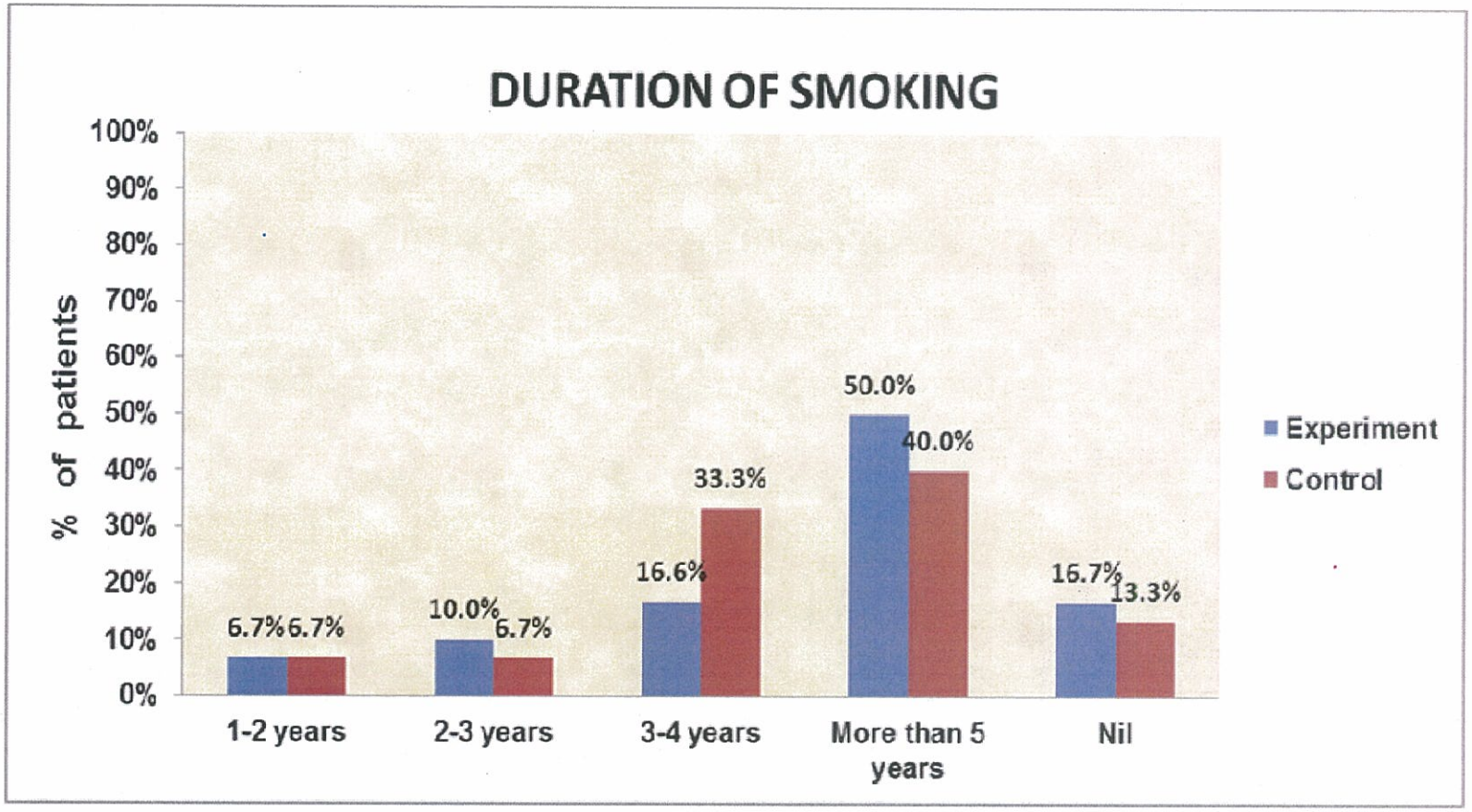


Figure 4.7 Distribution of duration of smoking of study participants

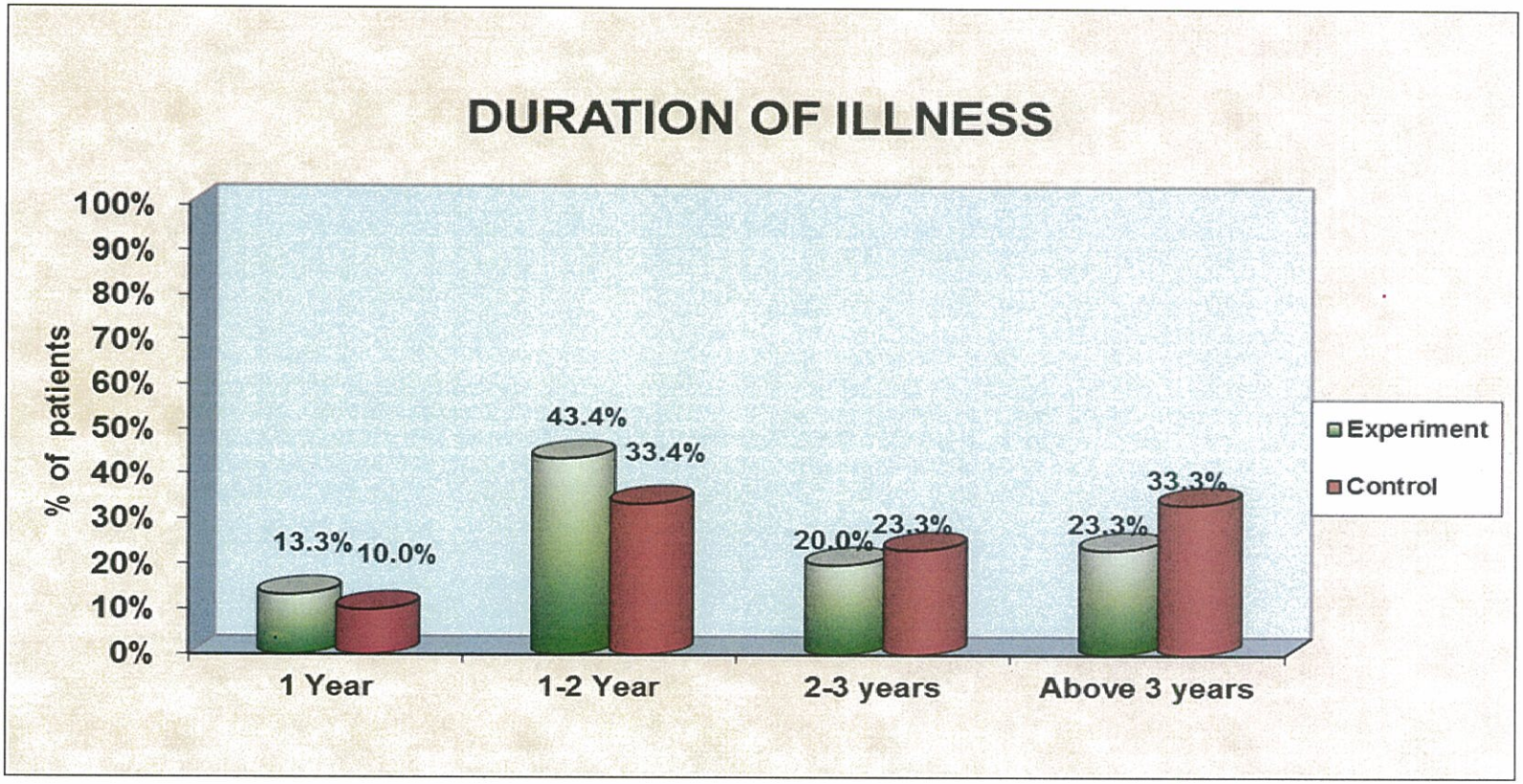


Figure 4.8 Distribution of duration of illness of study participants

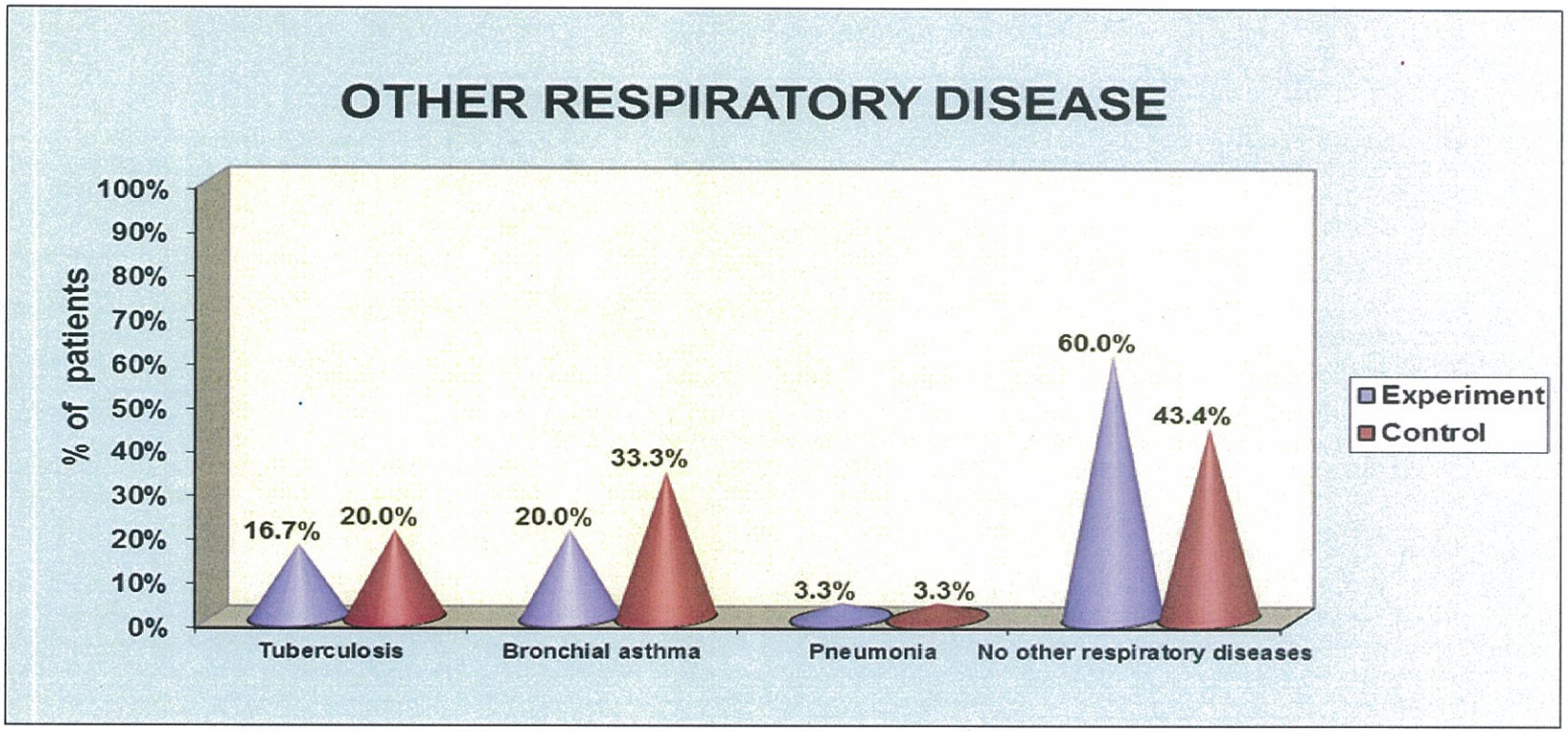


Figure 4.9 Distribution of other respiratory disease of study participants

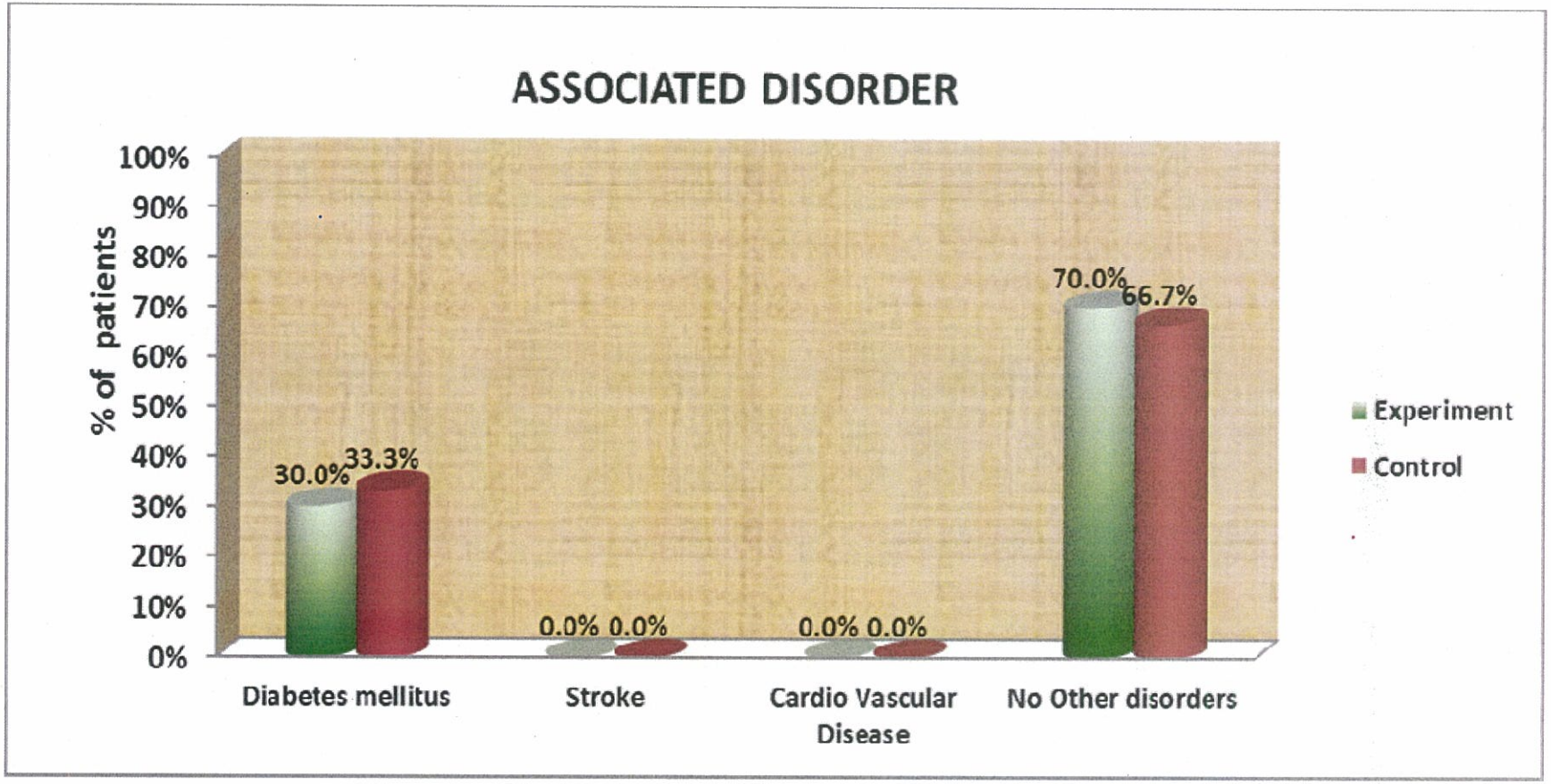


Figure 4.10 Distribution of comorbid illness of study participants

Section B : Assessment of the symptoms of chronic obstructive pulmonary disease in experimental and control group before administering halo therapy.

Table4.2: Frequency and distribution of airway clearance assessment scale score before administering halo therapy

Symptoms		Experiment(n=30)		Control(n=30)		Chi square test
		N	%	N	%	
Respiratory Rate Assessment	Severe Tachypnea	28	93.3%	29	96.7%	$\chi2=0.35$ P=0.55 DF=1
	Tachypnea	2	6.7%	1	3.3%	
	Normal	0	0.0%	0	0.0%	
Auscultation Findings of Lungs	No abnormal breath sounds	0	0.0%	0	0.0%	$\chi2=0.32$P=0.57 DF=1
	Moderate wheeze	22	73.3%	20	66.7%	
	Extensive wheeze	8	26.7%	10	33.3%	
	Crackles	0	0.0%	0	0.0%	
Modified Saturation Scale	More than 94%	0	0.0%	0	0.0%	$\chi2=0.57$ P=0.45 DF=1
	90-93%	5	16.7%	3	10.0%	
	88-89%	25	83.3%	27	90.0%	
Modified Medical Research Council (MRC)Dyspnea Scale	No breathlessness except with strenuous exercise	0	0.0%	0	0.0%	$\chi2=0.27$ P=0.59 DF=1
	Breathlessness when hurrying on the level or walking up a slight hill	13	43.3%	11	36.7%	
	Walk slower on level ground because of breathlessness or has to stop for breath when walking at own phase	17	56.7%	19	63.3%	
	Stops for breath after walking about 100 meter or after a few minutes on level ground	0	0.0%	0	0.0%	
	Too breathlessness to leave the house or breathlessness when dressing or undressing	0	0.0%	0	0.0%	
Oxygen requirement	Not required	0	0.0%	0	0.0%	$\chi2=0.35$ P=0.55DF=1
	2-4 Liters/minute	28	93.3%	29	96.7%	
	4-6 Liters/minute	2	6.7%	1	3.3%	
	Above 6 liters/minute	0	0.0%	0	0.0%	
Need for other medications	Additional nebulization	5	16.7%	2	6.7%	$\chi2=1.81$ P=0.40DF=2
	1 + Cortico steroids	22	73.3%	26	86.6%	
	1+2+ Systemic Broncho dilators	3	10.0%	2	6.7%	

The above table shows that the symptoms of chronic obstructive pulmonary disease such as respiratory rate, auscultation findings of lungs , modified saturation scale, modified medical research council (MRC)dyspnea scale, oxygen requirement and need for other medications were statistically had no significant difference between experiment and control group pre test airway clearance assessment scale score. It was calculated using chi square test

Table 4.3: Pre-test level of airway clearance assessment scale score

Level of score	Experiment		Control		Chi square test
	No. of patients	%	No. of patients	%	
Adequate	0	0.0%	0	0.0%	$\chi 2=0.10$ P=0.75 DF=1
Moderate	24	80.0%	23	76.7%	
Inadequate	6	20.0%	7	13.3%	
Total	30	100.0%	30	100.0%	

The above table shows that in the pretest, airway clearance assessment scale score. None of the patients are having adequate level score, 80.0% of them are having moderate level score and 20.0% of them are having inadequate level score in experimental group and none of the patients are having adequate level score, 76.7% of them are having moderate level score and 13.3%% of them are having inadequate level score.

Statistically had no significant difference between experiment and control group, it was confirmed using chi square test.

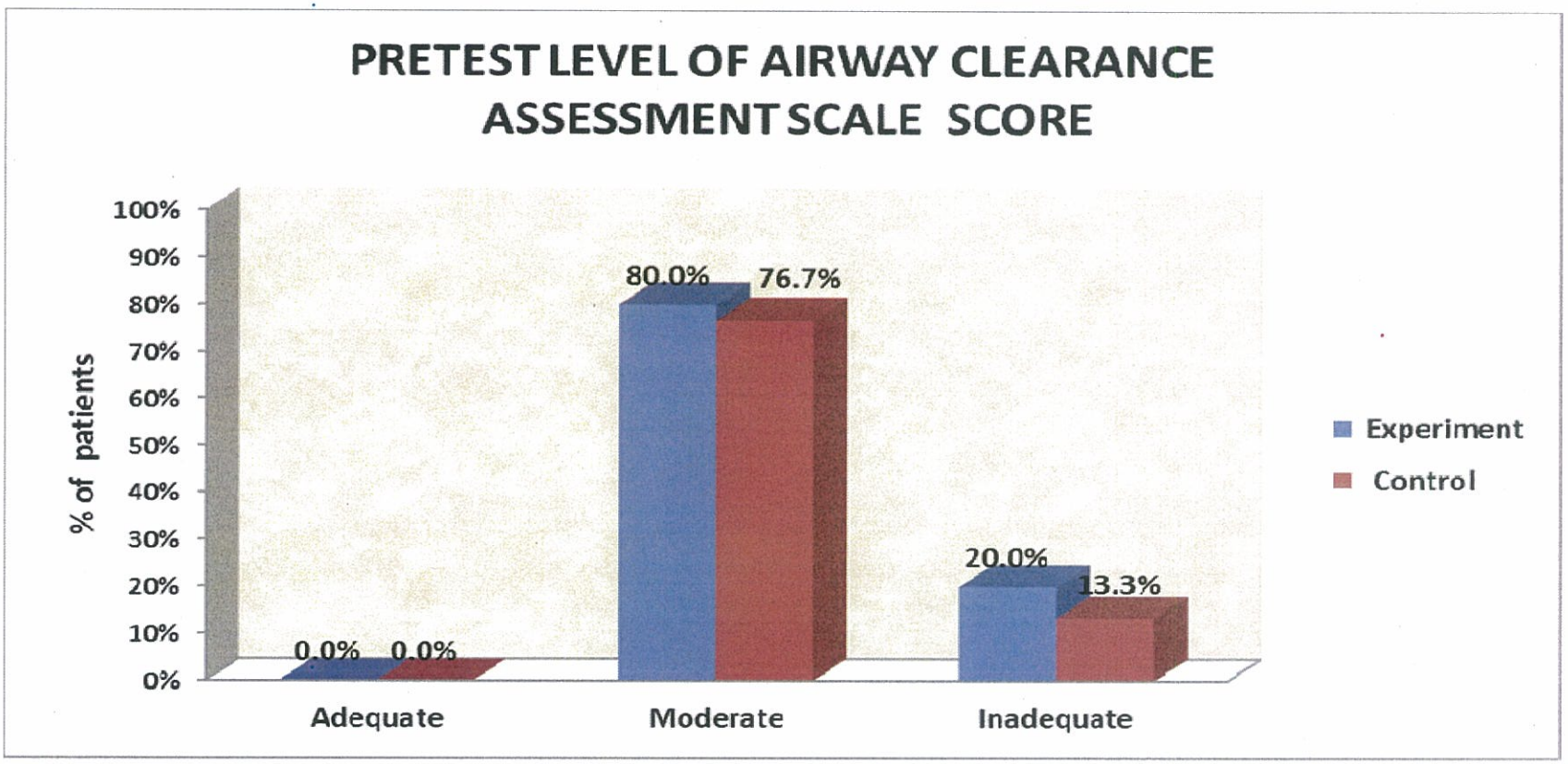


Figure 4.11 Pre test assessment of airway clearance score of study participants

Section C: Assessment of the effect of halotherapy in improving airway clearance in experimental group as post test.

Table.4.4: Frequency and distribution of Airway Clearance Assessment Scale score after administering halotherapy

Symptoms		Experiment (n=30)		Control (n=30)		Chi square test
		N	%	N	%	
Respiratory Rate Assessment	Severe Tachypnea	20	66.7%	28	93.3%	χ^2=6.93 P=0.03* DF=1
	Tachypnea	2	6.7%	0	0.0%	
	Normal	8	26.6%	2	6.7%	
Auscultation Findings of Lungs	No abnormal breath sounds	7	23.3%	1	3.3%	χ^2=6.49 P=0.04* DF=1
	Moderate wheeze	22	73.3%	25	83.3%	
	Extensive wheeze	1	3.3%	4	13.3%	
	Crackles	0	0.0%	0	0.0%	
Modified Saturation Scale	More than 94%	0	0.0%	0	0.0%	χ^2=11.42P=0.01** DF=1 Significant
	90-93%	27	90.0%	15	50.0%	
	88-89%	3	10.0%	15	50.0%	
Modified Medical Research Council (MRC)Dyspnea Scale	No breathlessness except with strenuous exercise	2	6.7%	0	0.0%	χ^2=13.38 P=0.01**DF=1
	Breathlessness when hurrying on the level or walking up a slight hill	26	86.6%	16	66.7%	
	Walk slower on level ground because of breathlessness or has to stop for breath when walking at own phase	2	6.7%	14	33.3%	
	Stops for breath after walking about 100 meter or after a few minutes on level ground	0	0.0%	0	0.0%	
	Too breathlessness to leave the house or breathlessness when dressing or undressing	0	0.0%	0	0.0%	

*Significant

** highly significant

The above table reveals that the symptoms of chronic obstructive pulmonary disease such as respiratory rate, auscultation findings of lungs, modified saturation scale and modified medical research council (MRC)dyspnea scale, were statistically had significant difference between experiment and control group post- test airway clearance assessment scale score. It was calculated using chi square test.

Table 4(Contd) Frequency and distribution of airway clearance assessment scale score after administering Halotherapy

Oxygen requirement	Not required	0	0.0%	0	0.0%	$\chi 2$=0.00 P=1.00 DF=1
	2-4 Liters/minute	27	100.0%	29	96.7%	
	4-6 Liters/minute	0	0.0%	1	3.3%	
	Above 6 liters/minute	0	0.0%	0	0.0%	
Need for other medications	Additional nebulization	4	13.3%	0	0.0%	$\chi 2$=5.45 P=0.06 DF=2
	1 + Cortico steroids	25	83.3%	30	100.0%	
	1+2+ Systemic Broncho dilators	1	3.3%	0	0.0%	

The above table shows that the symptoms of chronic obstructive pulmonary disease such as oxygen requirement and need for other medications were statistically had no significant difference between experiment and control group post -test airway clearance assessment scale score. It was calculated using chi square test.

Table 4.5: Post-test level of airway clearance assessment scale score

Level of score	Experiment		Control		Chi square test
	No. of patients	%	No. of patients	%	
Adequate	4	13.3%	0	0.0%	$\chi 2=5.16$ P=0.02* DF=1
Moderate	30	86.7%	27	90.0%	
Inadequate	0	0.0%	3	10.0%	
Total	30	100.0%	30	100.0%	

**significant P< 0.05*

The above table shows that in the post test airway clearance assessment scale score13.3%of the patients are having adequate level score, 86.7% of them are having moderate level score and none of them are having inadequate level score in experimental group and none of the patients are having adequate level score, 90.0% of them are having moderate level score and 10.0%% of them are having inadequate level score. Statistically there is a significant difference in post-test level of airway clearance between experiment and control group. It was confirmed using chi square test.

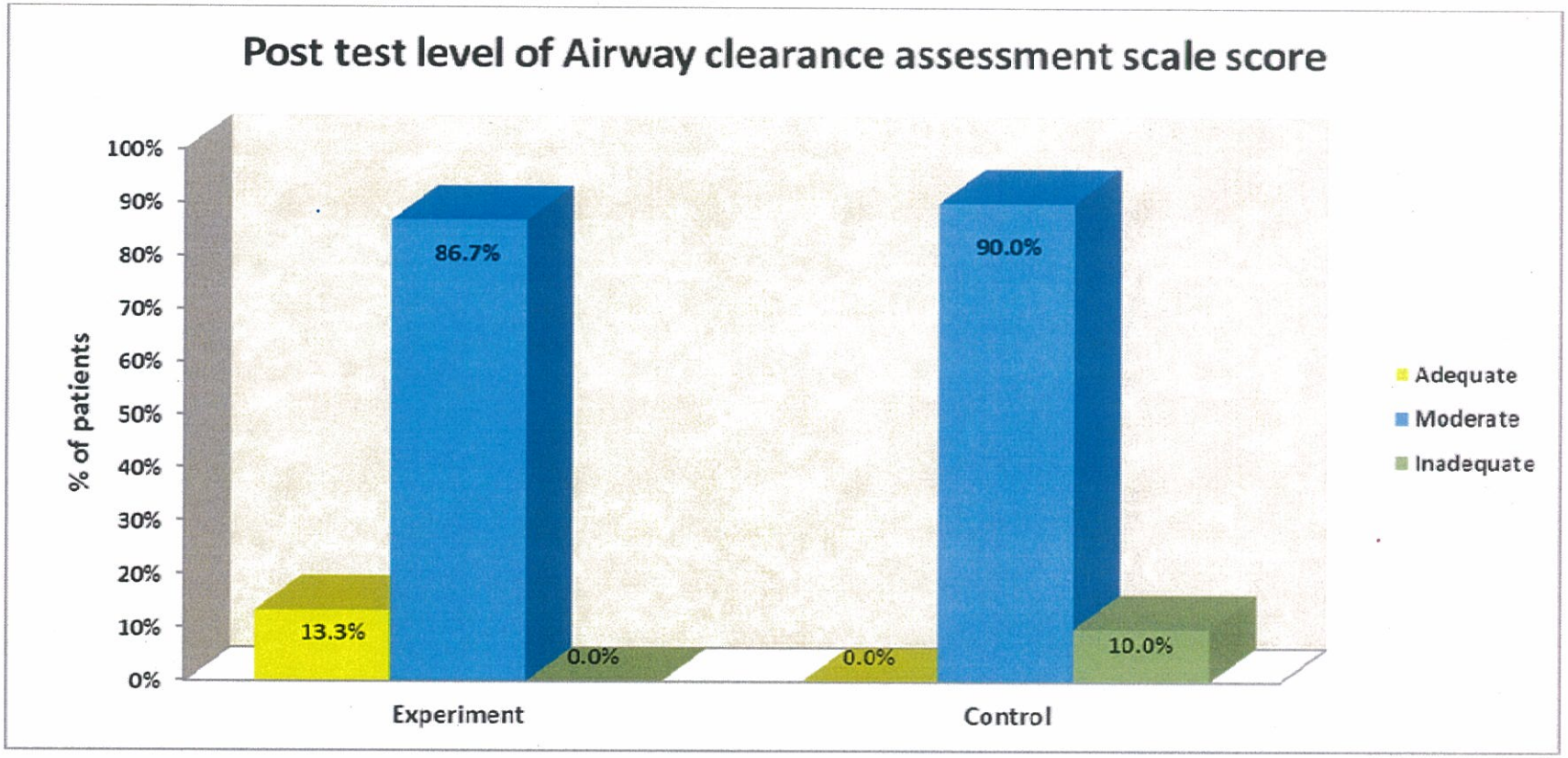


Figure 4.13 Post- test level of airway clearance assessment scale score of study participants

Section D : Comparison of the effect of Halotherapy in improving airway clearance of experimental group and control group

Table 4.6: Comparison of pretest and posttest airway clearance assessment scale score(Experiment)

Symptoms		Pretest(n=30)		Posttest(n=30)		Extended McNemar's test
		N	%	n	%	
Respiratory Rate Assessment	Severe Tachypnea	28	93.3%	20	66.7%	$\chi2$=9.53 P=0.01 ** DF=2
	Tachypnea	2	6.7%	2	6.7%	
	Normal	0	0.0%	8	26.6%	
Auscultation Findings of Lungs	No abnormal breath sounds	0	0.0%	7	23.3%	$\chi2$=12.44 P=0.01** DF=2
	Moderate wheeze	22	73.3%	22	73.3%	
	Extensive wheeze	8	26.7%	1	3.3%	
	Crackles	0	0.0%	0	0.0%	
Modified Saturation Scale	More than 94%	0	0.0%	0	0.0%	$\chi2$=22.00 P=0.001 *** DF=1
	90-93%	5	16.7%	27	90.0%	
	88-89%	25	83.3%	3	10.0%	
Modified Medical Research Council (MRC)Dyspnea Scale	No breathlessness except with strenuous exercise	0	0.0%	2	6.7%	$\chi2$=13.84 P=0.01 ** DF=2 t
	Breathlessness when hurrying on the level or walking up a slight hill	13	43.3%	26	86.6%	
	Walk slower on level ground because of breathlessness or has to stop for breath when walking at own phase	17	56.7%	2	6.7%	
	Stops for breath after walking about 100 meter or after a few minutes on level ground	0	0.0%	0	0.0%	
	Too breathlessness to leave the house or breathlessness when dressing or undressing	0	0.0%	0	0.0%	
Oxygen requirement	Not required	0	0.0%	0	0.0%	$\chi2$=2.00 P=0.15 DF=1
	2-4 Liters/minute	28	93.3%	27	100.0%	
	4-6 Liters/minute	2	6.7%	0	0.0%	
	Above 6 liters/minute	0	0.0%	0	0.0%	
Need for other medications	Additional nebulization	5	16.7%	4	13.3%	$\chi2$=2.33 P=0.31 DF=2
	1 + Cortico steroids	22	73.3%	25	83.4%	
	1+2+ Systemic Broncho dilators	3	10.0%	1	3.3%	

*significant

** highly significant

***very highly significant

There is a significant reduction in the following symptom scores: Respiratory rate assessment, auscultation findings of lungs, modified saturation scale and modified (MRC) dyspnea scale. Statistically there is significant difference between pretest and posttest score in experimental group. It was calculated by using Extended McNemar's test.

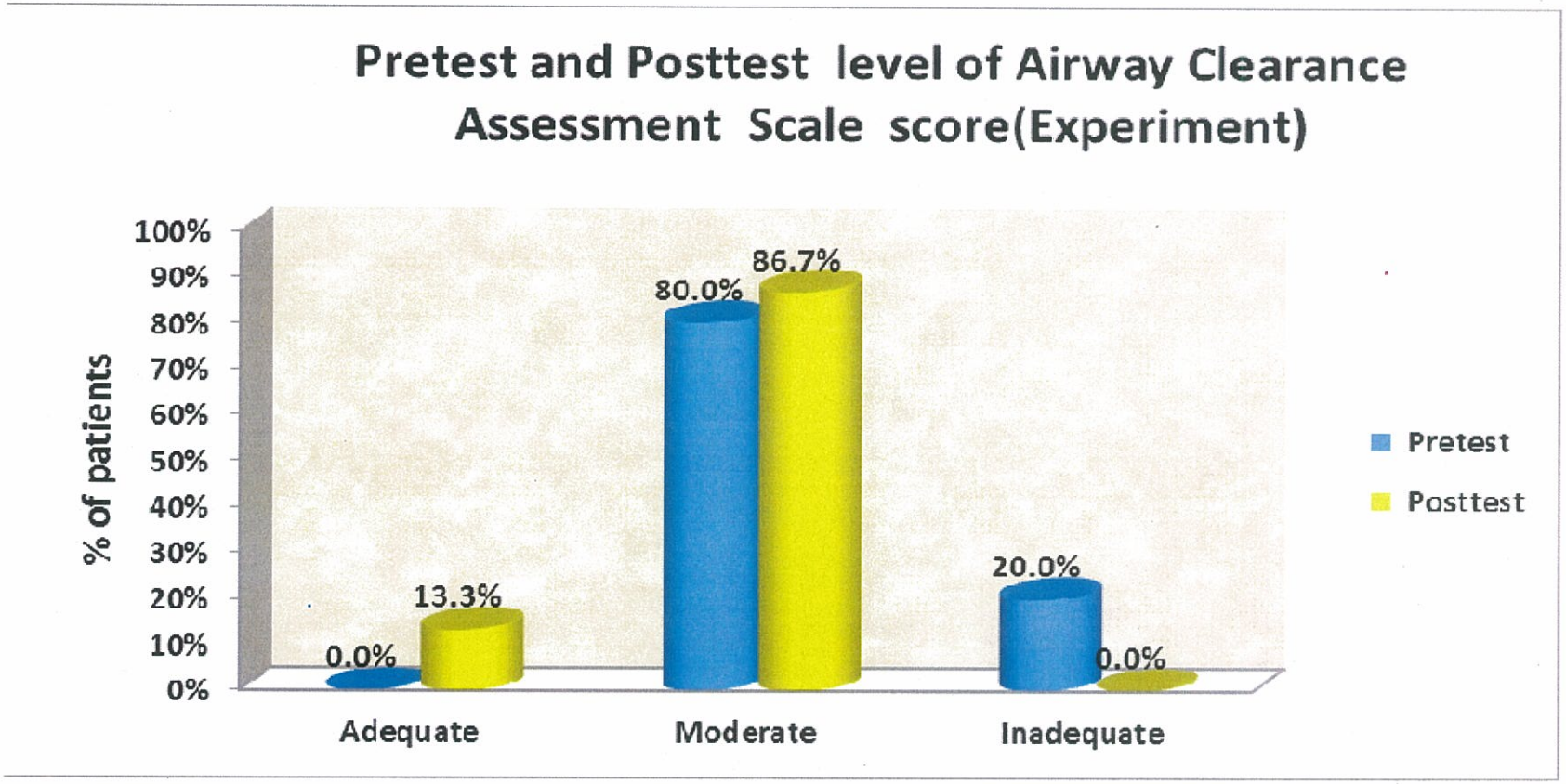


Figure 4.14Comparison of pretest and posttest airway clearance assessment scale score (Experiment)

Table 4.7: Comparison of pretest and posttest airway clearance assessment scale score (control)

Symptoms		Pretest(n=30)		Posttest(n=30)		Extended McNemar's test
		N	%	n	%	
Respiratory Rate Assessment	Severe Tachypnea	29	96.7%	28	93.3%	$\chi2$=3.00 P=0.22 DF=2
	Tachypnea	1	3.3%	0	0.0%	
	Normal	0	0.0%	2	6.7%	
Auscultation Findings of Lungs	No abnormal breath sounds	0	0.0%	1	3.3%	$\chi2$=5.50 P=0.06 DF=2
	Moderate wheeze	20	66.7%	25	83.3%	
	Extensive wheeze	10	33.3%	4	13.3%	
	Crackles	0	0.0%	0	0.0%	
Modified Saturation Scale	More than 94%	0	0.0%	0	0.0%	**$\chi2$=11.42 P=0.01 ** DF=1**
	90-93%	3	10.0%	15	50.0%	
	88-89%	27	90.0%	15	50.0%	
Modified Medical Research Council (MRC)Dyspnea Scale	No breathlessness except with strenuous exercise	0	0.0%	0	0.0%	$\chi2$=1.68P=0.19 DF=1
	Breathlessness when hurrying on the level or walking up a slight hill	11	36.7%	16	66.7%	
	Walk slower on level ground because of breathlessness or has to stop for breath when walking at own phase	19	63.3%	14	33.3%	
	Stops for breath after walking about 100 meter or after a few minutes on level ground	0	0.0%	0	0.0%	
	Too breathlessness to leave the house or breathlessness when dressing or undressing	0	0.0%	0	0.0%	
Oxygen requirement	Not required	0	0.0%	0	0.0%	$\chi2$=0.00 P=1.00DF=1
	2-4 Liters/minute	29	96.7%	29	96.7%	
	4-6 Liters/minute	1	3.3%	1	3.3%	
	Above 6 liters/minute	0	0.0%	0	0.0%	
Need for other medications	Additional nebulization	2	6.7%	0	0.0%	$\chi2$=4.33 P=0.11DF=2
	1 + Cortico steroids	26	86.6%	30	100.0%	
	1+2+ Systemic Broncho dilators	2	6.7%	0	0.0%	

**Highly significant

There is a significant reductionin the modified saturation scale symptom scores. Statistically there is significant difference between pretest and posttest score of control group. It was calculated using Extended McNemar's test.

Table 4.8: Pretest and posttest level of airway clearance assessment scale score(Experiment)

Level of score	Pretest		Posttest		*McNemar's test*
	No. of patients	%	No. of patients	%	
Adequate	0	0.0%	4	13.3%	**$\chi 2$=6.00 P=0.01****
Moderate	24	80.0%	30	86.7%	**DF=2**
Inadequate	6	20.0%	0	0.0%	
Total	30	100.0%	30	100.0%	

*** Highly significant P< 0.01*

The above table reveals that in the pretest and post-test level of airway clearance assessment scale score of experimental group. In the pre-test, none of the patients are having adequate level score, 80.0% of them are having moderate level score and 20% of them are having inadequate level score and in post-test, 13.4% of the patients are having adequate level score, 86.70% of them are having moderate level score and none of them are having Inadequate level score in experimental group

Statistically there is a significant difference between pre-test and post-test level of airway clearance assessment scale score in experiment group. It was confirmed using McNemar's test .

Table 4.9: Pre-test and post-test level of airway clearance assessment scale score(Control)

Level of score	Pretest		Posttest		*McNemar's test*
	No. of patients	%	No. of patients	%	
Adequate	0	0.0%	0	0.0%	$\chi 2$=2.35 P=0.13 DF=1
Moderate	24	80.0%	27	90.0%	
Inadequate	6	20.0%	3	10.0%	
Total	30	100.0%	30	100.0%	

The above table shows the pre-test and post-test level of airway clearance assessment scale score of control group. In pre-test, none of the patients are having adequate level score, 80.0% of them are having moderate level score and 20% of them are having inadequate level score andin post -test, none of the patients are having adequate level score, 100.0% of them are having moderate level score and none of them are having Inadequate level score

Statistically there is no significant difference between pre-test and post-test level of airway clearance assessment scale scoreof control It was confirmed using McNemar's test .

Table4.10: Effectiveness of Halotherapy in improving airway clearance of experimental and control group.

				Symptoms score **Mean ± SD**	**Mean Difference**	**Student paired t-test**
Experiment	Pretest			8.73±0.98	2.23	t=13.62 P=0.001***
	Posttest			6.50±0.86		
Control	Pretest			8.93±0.98	0.47	t=1.91 P=0.06
	Posttest			8.47±1.22		

*** Very highly significant at p= 0.001

The above table shows the mean difference of symptoms score reduction between pretest and posttest. Considering experiment group, patients are reduced 2.23 symptoms score, t= 13.62,p=0.001, this difference is statistically significant, whereas control group patients reduced 0.47symptoms scoret=1.91,p=0.06, this difference is statistically not significant. It was calculated using student paired t-test.

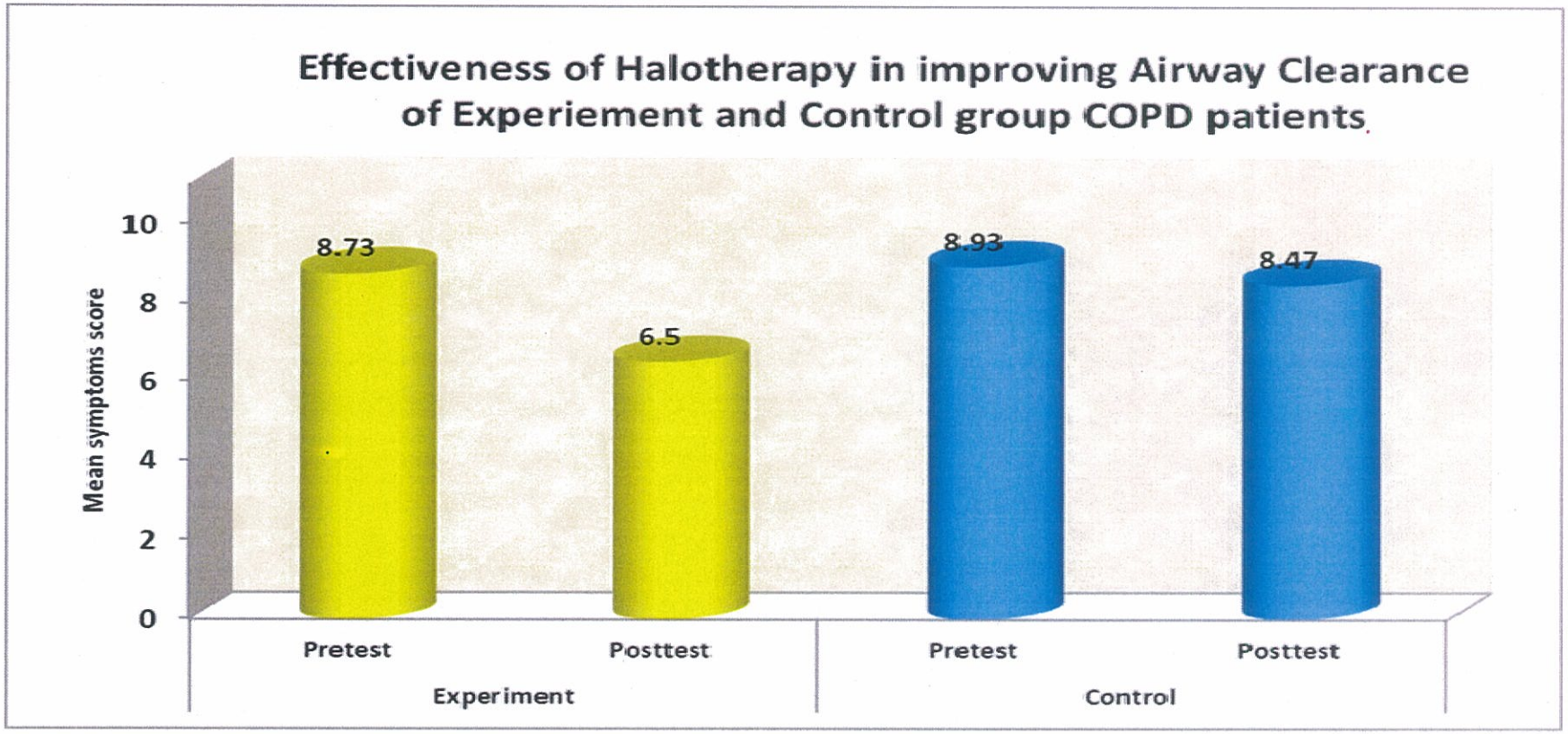


Figure4.15 Effectiveness of Halotherapy in improving airway clearance of Experimental and Control group.

Table 4.11: Effectiveness of Halotherapy in improving airway clearance of experimental group by comparing control group

		Symptoms score Mean ± SD	Mean Difference in score with 95% Confidence interval	Percentage of REDUCTION score from baseline data with 95% Confidence interval
Experiment	Pretest	8.73±0.98	2.23(1.90 – 2.57)	25.5%(21.8% –29.4%)
	Posttest	6.50±0.86		
Control	Pretest	8.93±0.98	0.47(-0.03 – 0.96)	5.2%(-0.5% –10.7%)
	Posttest	8.47±1.22		

The above table depicts the percentage of symptoms score reduction between pretest and posttest. Considering experiment group, On an average, in posttest, patients are **reduced 25.5%** of symptoms score after administration of **halotherapy** intervention, whereas considering control group, they reduced only 5.2% of symptoms score after **routine treatment**. This 25.5% of symptoms score reduction score among experiment group shows the **effectiveness** of **halotherapy** intervention. Differences between pre-test and post - test score was analysed using proportion with 95% Confidence interval and mean difference with 95% confidence interval.

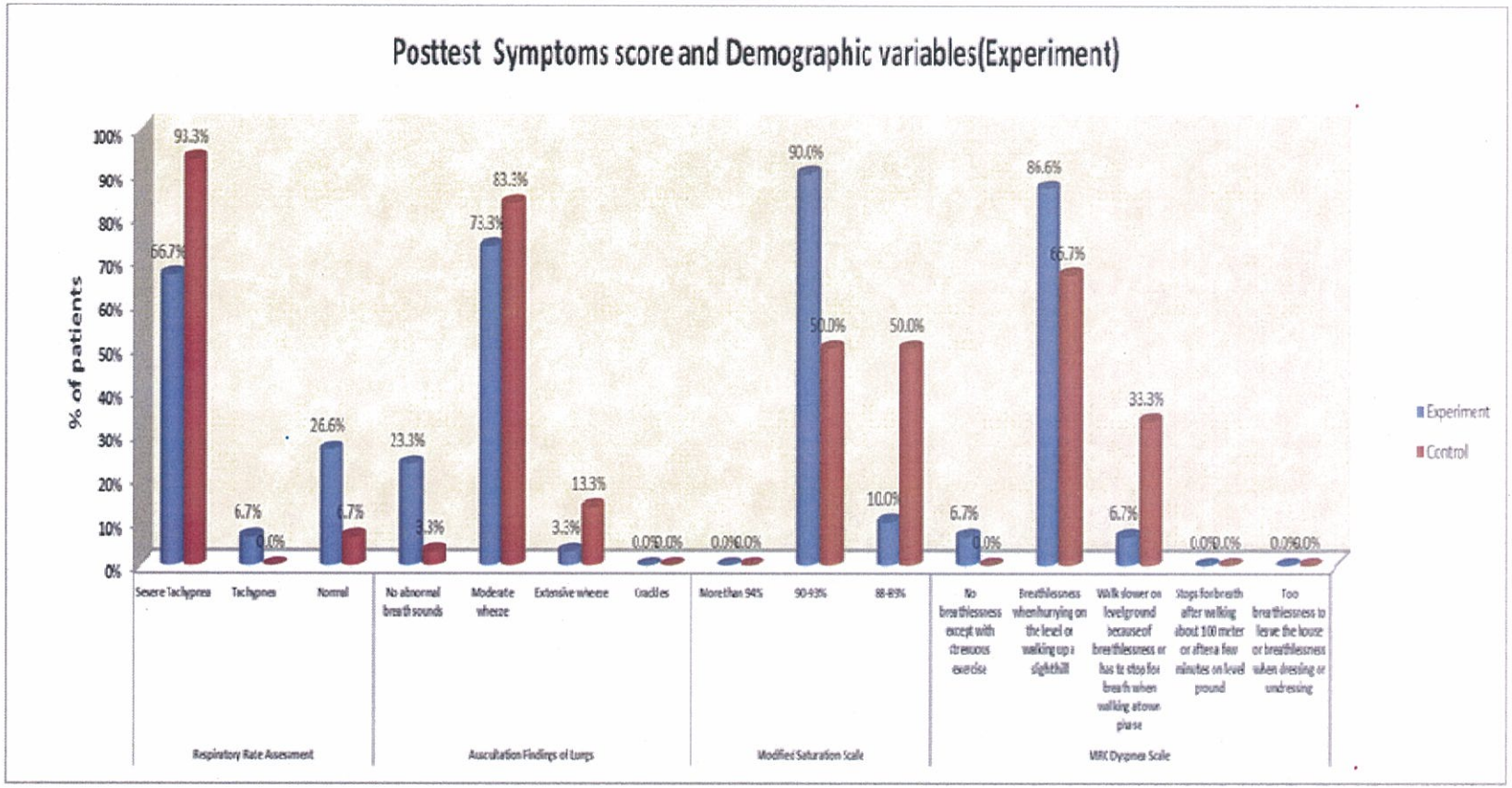


Figure4.12 Post -test symptoms score and demographic variables of study participants

Section E : Association of post-test level of airway clearance with the selected Demographic variables in the experimental and control group

Table 4.12: Association between pre-test level of symptoms score and demographic variables(Experiment)

Demographic variables		Pretest level of symptoms score				Total	Chi square test
		Moderate		Inadequate			
		N	%	N	%		
AGE	21 -30 years	0	0.0%	0	0.0%	0	$\chi2$=1.66
	31 -40 years	3	60.0%	2	40.0%	5	P=0.43
	41 -50 years	8	80.0%	2	20.0%	10	DF=3
	51 -60 years	13	86.7%	2	13.3%	15	
SEX	Male	18	75.0%	6	25.0%	24	$\chi2$=1.87
	Female	6	100.0%	0	0.0%	6	P=0.17 DF=1
ECONOMIC STATUS	Lower class	5	100.0%	0	0.0%	5	$\chi2$=1.50 P=0.22
	Middle class	19	76.0%	6	24.0%	25	DF=2
	Upper class	0	0.0%	0	0.0%	0	
PLACE OF LIVING	Urban	9	75.0%	3	25.0%	12	$\chi2$=0.57 P=0.90
	Rural	7	87.5%	1	12.5%	8	DF=3
	Industrial area	5	83.3%	1	16.7%	6	
	Near to cotton industry	3	75.0%	1	25.0%	4	
OCCUPATION	Sedentary	7	100.0%	0	0.0%	7	$\chi2$=2.29 P=0.32
	Moderate Worker	11	73.3%	4	26.7%	15	DF=2
	Heavy Worker	6	75.0%	2	25.0%	8	
NATURE OF WORK	Cotton industry	3	75.0%	1	25.0%	4	$\chi2$=1.14 P=0.88
	Cement Industry	2	100.0%			2	DF=4
	Coal mines	1	100.0%			1	
	Sugar cane industry	2	66.7%	1	33.3%	3	
	None of the above	16	80.0%	4	20.0%	20	
DURATION OF SMOKING	1-2 years	2	100.0%			2	$\chi2$=4.16 P=0.38
	2-3 years	3	100.0%			3	DF=4
	3-4 years	4	80.0%	1	20.0%	5	
	More than 5 years	10	66.7%	5	33.3%	15	
	Nil	5	100.0%			5	
DURATION OF ILLNESS	1 Year	3	75.0%	1	25.0%	4	$\chi2$=0.33 P=0.95
	1-2 Year	10	76.9%	3	23.1%	13	DF=3
	2-3 years	5	83.3%	1	16.7%	6	
	Above 3 years	6	85.7%	1	14.3%	7	
OTHER RESPIRATORY DISEASE	Tuberculosis	3	60.0%	2	40.0%	5	$\chi2$=6.87 P=0.08
	Bronchial asthma	6	100.0%			6	DF=3
	Pneumonia			1	100.0%	1	
	No other respiratory diseases	15	83.3%	3	16.7%	18	
COMORBID ILLNESS	Diabetes mellitus	7	77.8%	2	22.2%	9	$\chi2$=0.04 P=0.88
	Stroke	0	0.0%	0	0.0%	0	DF=3
	Cardio Vascular Disease	0	0.0%	0	0.0%	0	
	No Other disorders	17	81.0%	4	19.0%	21	

The above table shows the association between pretest level of symptoms score and demographic variables among experiment group. None of the variables are significantly associated with demographic variables. It was confirmed using chi square test.

Table 4.13: Association between Pretest level of symptoms score and Demographic variables(Control)

Demographic variables		Pretest level of symptoms score				Total	Chi square test
		Moderate		Inadequate			
		n	%	n	%		
AGE	21 -30 years	0	0.0%	0	0.0%	0	$\chi2$=1.66 P=0.43 DF=3
	31 -40 years	7	87.5%	1	12.5%	8	
	41 -50 years	6	54.5%	5	45.5%	11	
	51 -60 years	10	90.9%	1	9.1%	11	
SEX	Male	16	72.7%	6	27.3%	22	$\chi2$=0.71 P=0.39 DF=1
	Female	7	87.5%	1	12.5%	8	
ECONOMIC STATUS	Lower class	3	100.0%			3	$\chi2$=1.01 P=0.32 DF=2
	Middle class	20	74.1%	7	25.9%	27	
	Upper class	0	0.0%	0	0.0%	0	
PLACE OF LIVING	Urban	11	78.6%	3	21.4%	14	$\chi2$=3.96 P=0.26 DF=3
	Rural	3	50.0%	3	50.0%	6	
	Industrial area	4	80.0%	1	20.0%	5	
	Near to cotton industry	5	100.0%			5	
OCCUPATION	Sedentary	3	60.0%	2	40.0%	5	$\chi2$=1.55 P=0.46 DF=2
	Moderate Worker	12	75.0%	4	25.0%	16	
	Heavy Worker	8	88.9%	1	11.1%	9	
NATURE OF WORK	Cotton industry	4	80.0%	1	20.0%	5	$\chi2$=1.77 P=0.78 DF=4
	Cement Industry	2	100.0%			2	
	Coal mines	1	100.0%			1	
	Sugar cane industry	1	50.0%	1	50.0%	2	
	None of the above	15	75.0%	5	25.0%	20	
DURATION OF SMOKING	1-2 years	2	100.0%			2	$\chi2$=2.88 P=0.57 DF=4
	2-3 years	1	50.0%	1	50.0%	2	
	3-4 years	7	70.0%	3	30.0%	10	
	More than 5 years	9	75.0%	3	25.0%	12	
	Nil	4	100.0%			4	
DURATION OF ILLNESS	1 Year	3	100.0%			3	$\chi2$=6.44 P=0.09 DF=3
	1-2 Year	9	90.0%	1	10.0%	10	
	2-3 years	3	42.9%	4	57.1%	7	
	Above 3 years	8	80.0%	2	20.0%	10	
OTHER RESPIRATORY DISEASE	Tuberculosis	6	100.0%			6	$\chi2$=5.36 P=0.14 DF=3
	Bronchial asthma	7	70.0%	3	30.0%	10	
	Pneumonia			1	100.0%	1	
	No other respiratory diseases	10	76.9%	3	23.1%	13	
COMORBID ILLNESS	Diabetes mellitus	9	90.0%	1	10.0%	10	$\chi2$=1.49 P=0.12 DF=3
	Stroke	0	0.0%	0	0.0%	0	
	Cardio Vascular Disease	0	0.0%	0	0.0%	0	
	No Other disorders	14	70.0%	6	30.0%	20	

The above table shows the association between pretest level of symptoms score and demographic variables among control group. None of the variables are significantly associated with demographic variables. It was confirmed using chi square test.

Table 4.14: Association between post-test level of symptoms score and demographic variables(Experiment)

Demographic variables		Posttest level of symptoms score				Total	Chi square test
		Adequate		Moderate			
		n	%	n	%		
AGE	21 -30 years	0	0.0%	0	0.0%	0	**χ2=11.82 P=0.01** DF=3**
	31 -40 years	3	60.0%	2	40.0%	5	
	41 -50 years	1	10.0%	9	90.0%	10	
	51 -60 years	0	0.0%	15	100.0%	15	
SEX	Male	1	4.2%	23	95.8%	24	**χ2=8.72 P=0.01** DF=1**
	Female	3	50.0%	3	50.0%	6	
ECONOMIC STATUS	Lower class	1	20.0%	4	80.0%	5	χ2=0.23 P=0.63 DF=2
	Middle class	3	12.0%	22	88.0%	25	
	Upper class	0	0.0%	0	0.0%	0	
PLACE OF LIVING	Urban	3	25.0%	9	75.0%	12	χ2=2.95 P=0.39 DF=3
	Rural	1	12.5%	7	87.5%	8	
	Industrial area	0	0.0%	6	100.0%	6	
	Near to cotton industry	0	0.0%	4	100.0%	4	
OCCUPATION	Sedentary	4	57.1%	3	42.9%	7	**χ2=15.16 P=0.01** DF=2**
	Moderate Worker	0	0.0%	15	100.0%	15	
	Heavy Worker	0	0.0%	8	100.0%	8	
NATURE OF WORK	Cotton industry	1	25.0%	3	75.0%	4	χ2=1.44 P=0.83 DF=4
	Cement Industry	0	0.0%	2	100.0%	2	
	Coal mines	0	0.0%	1	100.0%	1	
	Sugar cane industry	0	0.0%	3	100.0%	3	
	None of the above	3	15.0%	17	85.0%	20	
DURATION OF SMOKING	1-2 years	1	50.0%	1	50.0%	2	χ2=4.90 P=0.29 DF=4
	2-3 years	1	33.3%	2	66.7%	3	
	3-4 years	1	20.0%	4	80.0%	5	
	More than 5 years	1	6.7%	14	93.3%	15	
	Nil	0	0.0%	5	100.0%	5	
DURATION OF ILLNESS	1 Year	3	75.0%	1	25.0%	4	**χ2=15.52P=0.01** DF=3**
	1-2 Year	1	7.6%	12	92.4%	13	
	2-3 years	0	0.0%	6	100.0%	6	
	Above 3 years	0	0.0%	7	100.0%	7	
OTHER RESPIRATORY DISEASE	Tuberculosis			5	100.0%	5	χ2=3.07 P=0.38 DF=3
	Bronchial asthma			6	100.0%	6	
	Pneumonia			1	100.0%	1	
	No other respiratory diseases	4	22.2%	14	77.8%	18	
ASSOCIATED DISORDER	Diabetes mellitus	1	11.1%	8	88.9%	9	χ2=0.06P=0.81 DF=1
	Stroke	0	0.0%	0	0.0%	0	
	Cardio Vascular Disease	0	0.0%	0	0.0%	0	
	No Other disorders	3	14.2%	18	85.8%	21	

* significant at P ≤0.05,

** highly significant at P ≤0.01,

The above table shows the association between post-test level of symptoms score and demographic variables among experiment group. Younger age group, females, sedentary workers, less duration of illness patients are benefitted more than others with the post-test level of airway clearance in the experimental group at $p< 0.05$ and economic status, place of living, nature of work, duration of smoking, other respiratory diseases and associated disorders had statistically no significant association with the post-test level of airway clearance in the experimental group. It was confirmed using chi square test.

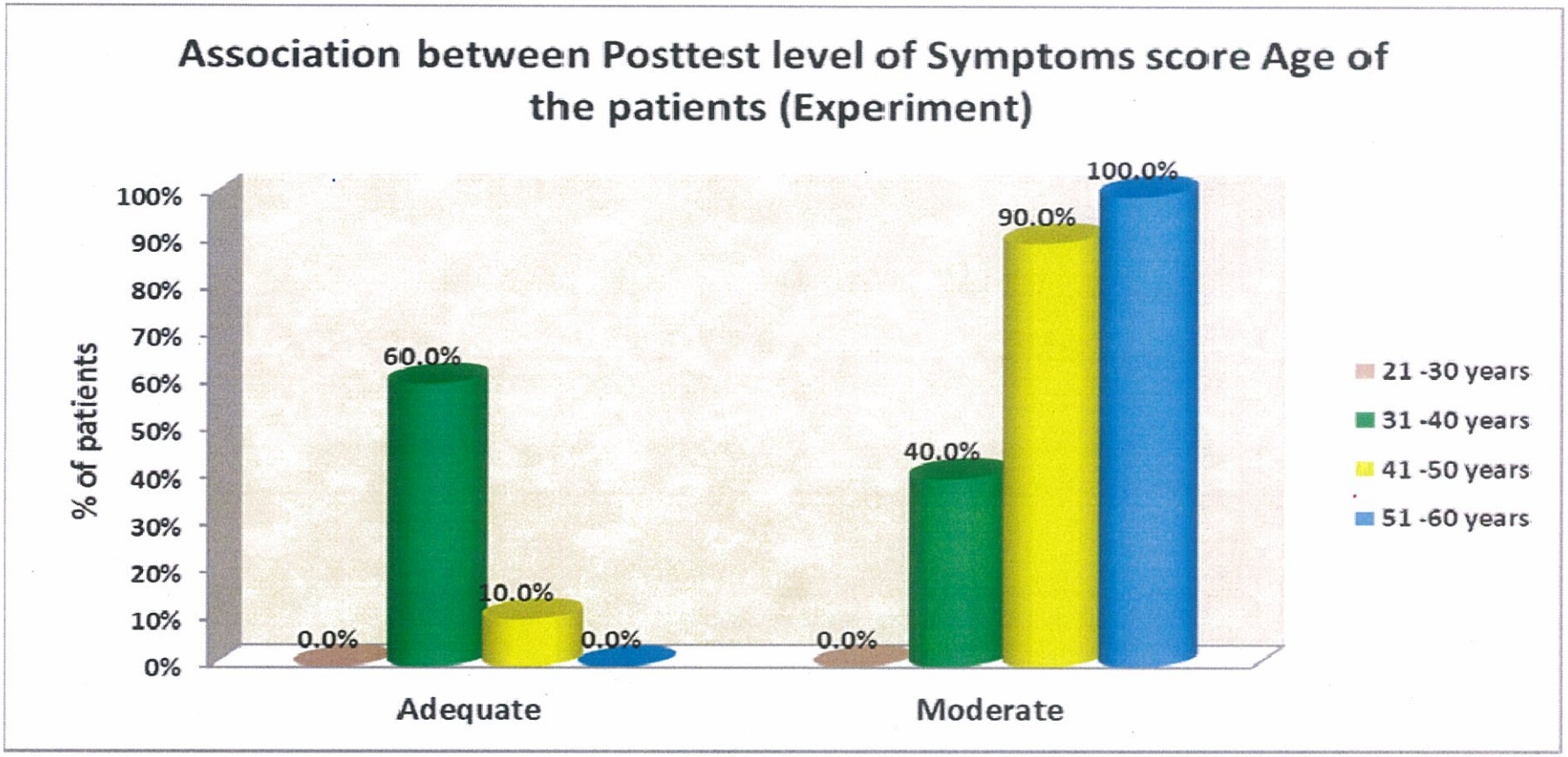


Figure4.16 Association between post test level of symptoms score and age of the patients (experiment) with chronic obstructive pulmonary disease

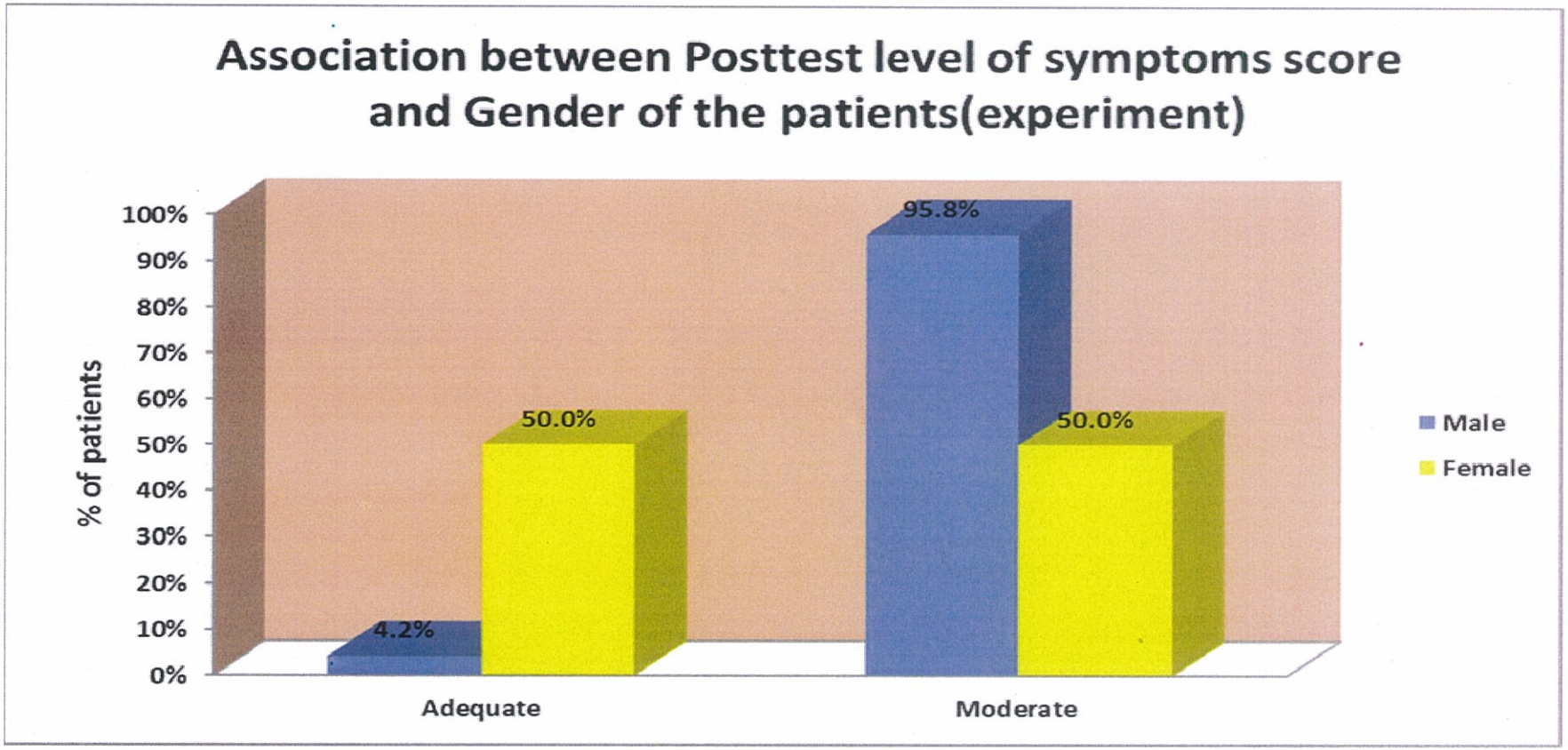


Figure 4.17 Association between post test level of symptoms score and gender

Of the patients (experiment) with chronic obstructive pulmonary disease

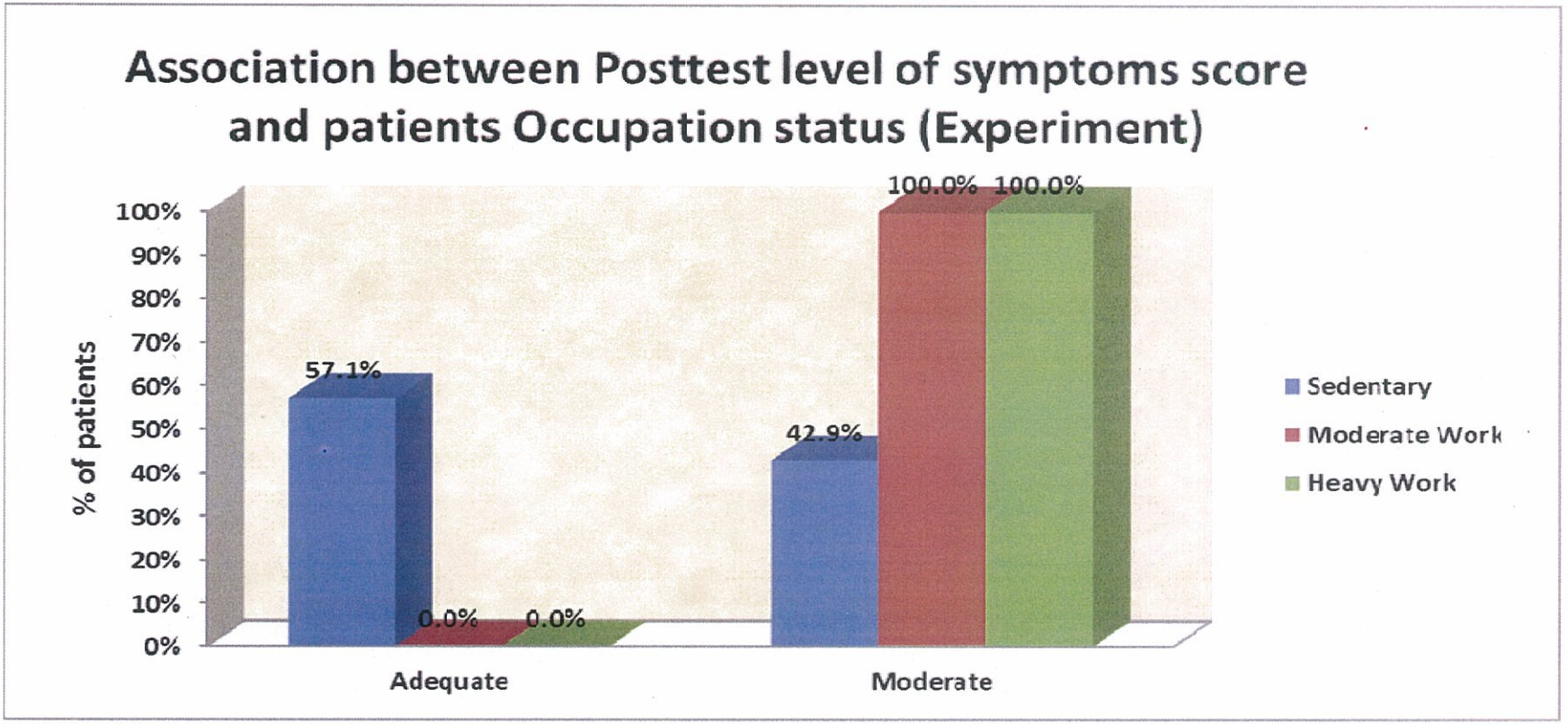


Figure4.18 Association between post test level of symptoms score and patients occupation status (experiment)

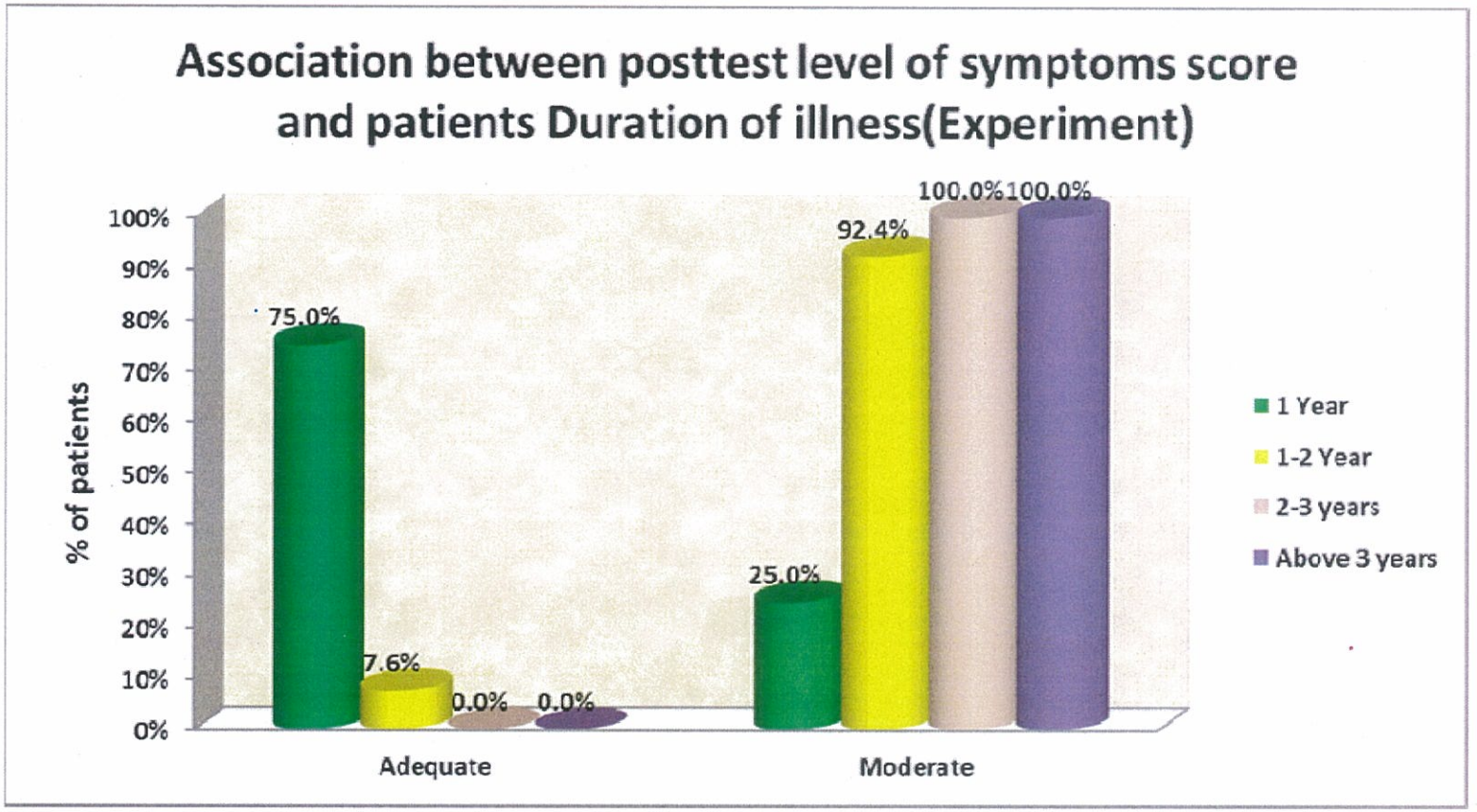


Figure 4.19 Association between post test level of symptoms score and duration of illness of the patients (experiment) with chronic obstructive pulmonary disease

Table 4.15: Association between post-test level of symptoms score and demographic variables(Control)

Demographic variables		Posttest level of symptoms score				Total	Chi square test
		Moderate		Inadequate			
		n	%	n	%		
AGE	21 -30 years	0	0.0%	0	0.0%	0	$\chi2$=5.75 P=0.06
	31 -40 years	8	100.0%			8	DF=3
	41 -50 years	8	72.7%	3	27.3%	11	
	51 -60 years	11	100.0%			11	
SEX	Male	19	86.4%	3	13.6%	22	$\chi2$=1.21 P=0.27
	Female	8	100.0%			8	DF=1
ECONOMIC STATUS	Lower class	3	100.0%			3	$\chi2$=0.37 P=0.54
	Middle class	24	88.9%	3	11.1%	27	DF=2
	Upper class	0	0.0%	0	0.0%	0	
PLACE OF LIVING	Urban	13	92.9%	1	7.1%	14	$\chi2$=4.86 P=0.16
	Rural	4	66.7%	2	33.3%	6	DF=3
	Industrial area	5	100.0%			5	
	Near to cotton industry	5	100.0%			5	
OCCUPATION	Sedentary	4	80.0%	1	20.0%	5	$\chi2$=0.81 P=0.66
	Moderate Worker	15	93.8%	1	6.3%	16	DF=2
	Heavy Worker	8	88.9%	1	11.1%	9	
NATURE OF WORK	Cotton industry	5	100.0%			5	$\chi2$=1.66 P=0.78
	Cement Industry	2	100.0%			2	DF=4
	Coal mines	1	100.0%			1	
	Sugar cane industry	2	100.0%			2	
	None of the above	17	85.0%	3	15.0%	20	
DURATION OF SMOKING	1-2 years	2	100.0%			2	$\chi2$=4.25 P=0.37
	2-3 years	1	50.0%	1	50.0%	2	DF=4
	3-4 years	9	90.0%	1	10.0%	10	
	More than 5 years	11	91.7%	1	8.3%	12	
	Nil	4	100.0%			4	
DURATION OF ILLNESS	1 Year	3	100.0%			3	$\chi2$=0.47 P=0.92
	1-2 Year	9	90.0%	1	10.0%	10	DF=3
	2-3 years	6	85.7%	1	14.3%	7	
	Above 3 years	9	90.0%	1	10.0%	10	
OTHER RESPIRATORY DISEASE	Tuberculosis	6	100.0%			6	$\chi2$=4.35 P=0.22
	Bronchial asthma	10	100.0%			10	DF=3
	Pneumonia	1	100.0%			1	
	No other respiratory diseases	10	76.9%	3	23.1%	13	
ASSOCIATED DISORDER	Diabetes mellitus	9	90.0%	1	10.0%	10	$\chi2$=0.00 P=1.00
	Stroke	0	0.0%	0	0.0%	0	DF=3
	Cardio Vascular Disease	0	0.0%	0	0.0%	0	
	No Other disorders	18	90.0%	2	10.0%	20	

The above table shows the association between posttest level of symptoms score and demographic variables among control group. None of the variables are significantly associated with demographic variables. It was confirmed using chi square test.

Table 4.16: Association between symptoms reduction score and demographic variables(Experiment)

Demographic variables		N	Mean Symptoms score reduction						Oneway ANOVA F-test/t-test
			Pretest		Posttest		Reduction= pre –post		
			Mean	SD	Mean	SD	Mean	SD	
AGE	31 -40 years	5	8.60	1.34	6.00	.55	2.60	1.00	**F=3.37 P=0.05***
	41 -50 years	10	8.70	1.16	6.40	1.16	2.30	0.71	
	51 -60 years	15	8.80	.77	7.20	1.18	1.60	1.02	
SEX	Male	24	8.83	1.05	6.83	.82	2.00	0.88	**t=2.83 P=0.01****
	Female	6	8.33	.52	5.17	.98	3.17	0.98	
ECONOMIC STATUS	Lower class	5	8.60	.55	5.60	1.14	3.00	1.22	t=1.91 P=0.06
	Middle class	25	8.76	1.05	6.68	.99	2.08	0.91	
PLACE OF LIVING	Urban	12	9.08	.90	6.42	1.31	2.67	0.98	F=2.56 P=0.08
	Rural	8	8.38	.92	6.63	.74	1.75	0.71	
	Industrial area	6	9.00	.63	6.50	1.38	2.50	0.84	
	Near to cotton industry	4	8.00	1.41	6.50	.58	1.50	1.29	
OCCUPATION	Sedentary	7	8.71	.49	6.02	1.62	2.69	1.06	**F=3.29 P=0.05***
	Moderate Worker	15	8.93	1.03	6.67	1.06	2.26	1.00	
	Heavy Worker	8	8.38	1.19	6.96	.53	1.42	0.96	
NATURE OF WORK	Cotton industry	4	9.00	.82	6.50	1.73	2.50	1.29	F=1.44 P=0.25
	Cement Industry	2	9.00	.00	7.00	.00	2.00	0.00	
	Coal mines	1	7.00	.	7.00	0.00	0.00	0.00	
	Sugar cane industry	3	9.67	1.15	7.33	.58	2.33	0.58	
	None of the above	20	8.60	.94	6.30	1.03	2.30	0.98	
DURATION OF SMOKING	1-2 years	2	9.00	.00	7.50	.71	1.50	.71	F=0.40P=0.80
	2-3 years	3	9.00	.00	6.33	1.53	2.67	1.53	
	3-4 years	5	8.00	1.22	5.80	1.10	2.20	1.30	
	More than 5 years	15	9.07	1.03	6.87	.83	2.20	0.86	
	Nil	5	8.20	.45	5.80	1.10	2.40	1.14	
DURATION OF ILLNESS	1 Year	4	8.75	.96	5.92	1.41	2.80	0.96	**F=3.04 P=0.05*S**
	1-2 Year	13	8.54	1.13	5.86	1.11	2.68	1.21	
	2-3 years	6	8.83	.75	6.96	1.17	1.87	0.82	
	Above 3 years	7	9.00	1.00	7.61	.76	1.39	0.79	
OTHER RESPIRATORY DISEASE	Tuberculosis	5	9.20	1.30	6.60	1.67	2.60	0.89	F=0.52 P=0.67
	Bronchial asthma	6	8.33	.82	6.33	.82	2.00	0.63	
	Pneumonia	1	10.00	0.00	7.00	0.00	3.00	0.00	
	No other respiratory diseases	18	8.67	.91	6.50	1.04	2.17	1.15	
ASSOCIATED DISORDER	Diabetes mellitus	9	8.78	1.20	6.67	1.32	2.11	1.05	t=0.42 P=0.66
	No Other disorders	21	8.71	.90	6.43	.98	2.29	1.01	

* significant at P ≤0.05,

* Significant at $p \leq 0.05$

** Highly significant at $P \leq 0.01$,

The above table shows the association between symptoms reduction score and demographic variables among experiment group. Younger age group, females, sedentary workers, less duration of illness patients are benefitted more than others such as economic status, place of living, nature of work, duration of smoking, other respiratory diseases and associated disorders had statistically no significant association with the post-test level of airway clearance in the control group. It was confirmed using Oneway ANOVA F-test and student t-test.

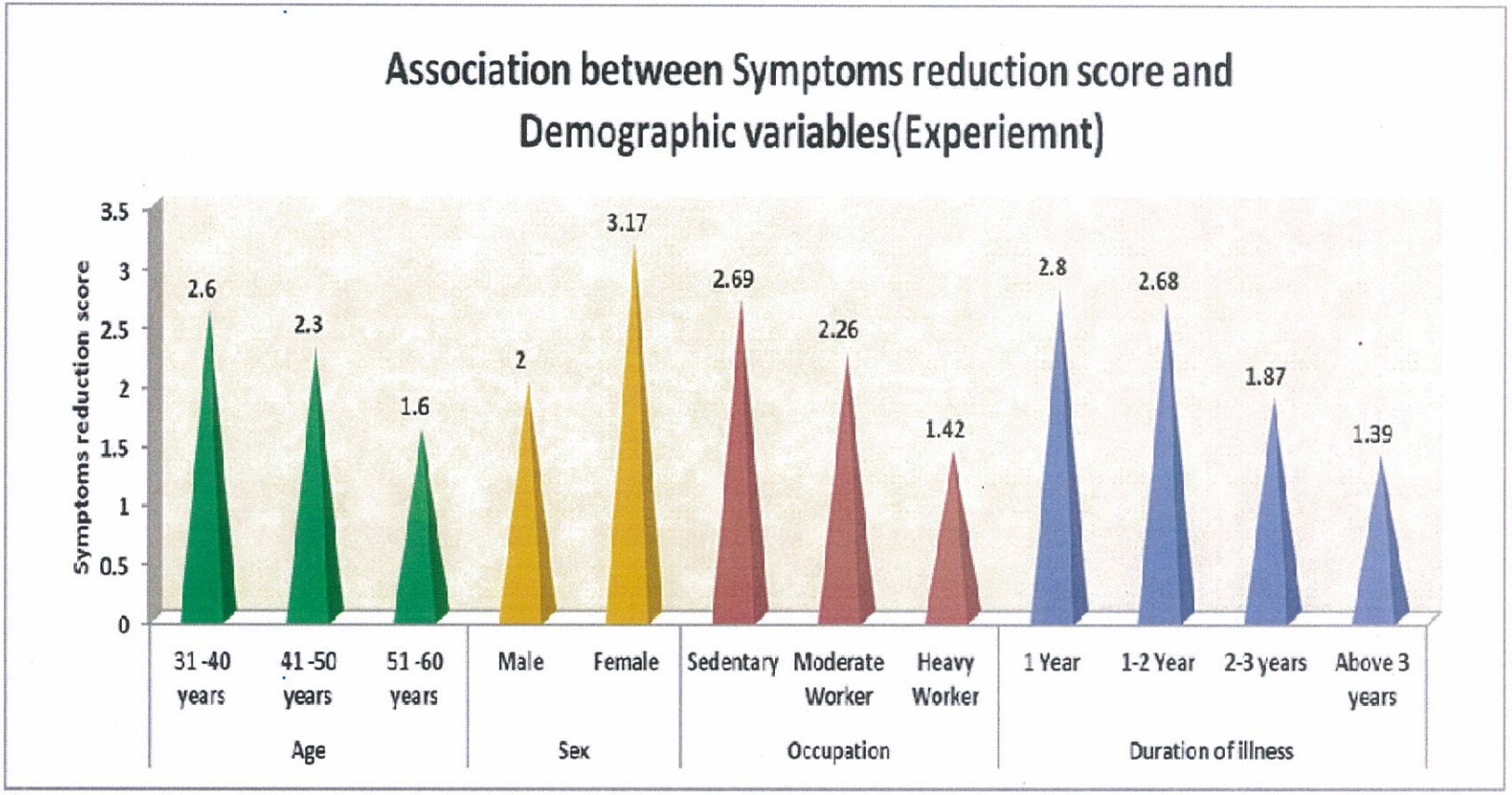


Figure 4.20 Association between symptoms reduction score and demographic variables of the patients (experiment) with chronic obstructive pulmonary disease

Table 4.17: Association between symptoms reduction score and demographic variables(control)

Demographic variables		N	Mean Symptoms score reduction						Oneway ANOVA F-test/t-test
			Pretest		Posttest		Reduction= pre –post		
			Mean	SD	Mean	SD	Mean	SD	
AGE	31 -40 years	8	9.00	.53	8.25	1.16	.75	1.39	F=1.07
	41 -50 years	11	9.27	1.35	9.27	1.10	.00	1.55	P=0.35
	51 -60 years	11	8.55	.69	7.82	.98	.73	1.01	
SEX	Male	22	9.00	1.02	8.36	1.26	.64	1.18	t=1.16
	Female	8	8.75	.89	8.75	1.16	.00	1.69	P=0.25
ECONOMIC STATUS	Lower class	3	8.33	.58	7.33	.58	1.00	1.00	t=0.72
	Middle class	27	9.00	1.00	8.59	1.22	.41	1.37	P=0.47
PLACE OF LIVING	Urban	14	9.07	.62	8.21	1.12	.86	.95	F=0.89
	Rural	6	9.17	.98	8.83	1.33	.33	.52	P=0.45
	Industrial area	5	9.00	1.87	8.80	1.30	.20	2.59	
	Near to cotton industry	5	8.20	.45	8.40	1.52	-.20	1.30	
OCCUPATION	Sedentary	5	9.20	.84	9.20	1.30	.00	.71	F=1.22
	Moderate Worker	16	9.19	.98	8.00	.97	1.19	.83	P=0.31
	Heavy Worker	9	8.33	.87	8.89	1.36	-.56	1.59	
NATURE OF WORK	Cotton industry	5	9.20	.45	8.00	1.00	1.20	0.84	F=0.89
	Cement Industry	2	8.50	.71	7.50	2.12	1.00	2.83	P=0.48
	Coal mines	1	9.00	.	9.00	.	0.00	0.00	
	Sugar cane industry	2	10.00	2.83	8.50	.71	1.50	2.12	
	None of the above	20	8.80	.89	8.55	1.32	0.25	1.25	
DURATION OF SMOKING	1-2 years	2	7.50	.71	7.00	.00	0.50	.71	F=0.92
	2-3 years	2	9.00	1.41	9.00	1.41	.00	.00	P=0.47
	3-4 years	10	9.10	.74	8.60	1.35	.50	1.35	
	More than 5 years	12	9.00	1.21	8.17	1.19	.83	1.03	
	Nil	4	9.00	.00	8.00	.82	1.00	.82	
DURATION OF ILLNESS	1 Year	3	8.00	.00	8.00	1.73	.00	1.73	F=0.44
	1-2 Year	10	9.00	.47	8.50	1.27	.50	1.35	P=0.72
	2-3 years	7	9.29	1.70	9.14	.90	.14	1.77	
	Above 3 years	10	8.90	.74	8.10	1.20	.80	.92	
OTHER RESPIRATORY DISEASE	Tuberculosis	6	8.83	.41	8.00	1.55	.83	1.47	F=0.65 P=0.58
	Bronchial asthma	10	9.10	1.29	8.40	1.07	.70	1.34	
	Pneumonia	1	10.00	.	9.00	.	1.00	.	
	No other respiratory diseases	13	8.77	.93	8.69	1.25	.08	1.32	
ASSOCIATED DISORDER	Diabetes mellitus	10	8.40	.84	8.60	1.26	-.20	1.48	t=1.87 P=0.08
	No Other disorders	20	9.20	.95	8.40	1.23	.80	1.15	

The above tableshows the association between symptoms reduction score and demographic variables among control group. None of the variables are significantly associated with demographic variables. It was confirmed using One-way ANOVA F-test and student independent t-test.

SUMMARY OF THE RESULTS

CHAPTER –V

SUMMARY OF STUDY FINDINGS

This chapter deals with the study which was done to determine the effectiveness of Halotherapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03.

Findings of demographic variables:

In demographic variables of the study participants (Experimental – 50.0%, Control- 36.7%) are between 51- 60 years, about 33.3% in experimental and 36.7 % in control group, 16.7 % in Experimental and 26.6% in Control group are between 31-40 years and no one is between the age group of 21-30 years in both the Experimental and Control group.

According to the gender males are commonly affected in experimental -80.0% and control -73.3% where as females in experimental 20.0% , control group-26.7%.

According to the economic status the middle class people are commonly affected with chronic obstructive pulmonary disease. It is about 83.3% in Experimental group and 90.0% in Control group.

In both the group most of the affected people are from urban areas, in Experimental -40.0% and in Control -46.6% than rural and industrial areas.

In occupation about 50.0% in Experimental and 53.3% in Control group are doing moderate work , 23.3% and 16.7% from sedentary worker in experimental and control group respectively.

According to nature of work the same percentage of 66.7% in both the group are not working in cotton ,cement, coal mine and sugar cane industry.

In duration of smoking, non -smokers are only 16.7% in Experimental and 13.3% in Control group whereas the people who smoke more than 5 years are about 50.0% in Experimental and 40.0% in Control group.

The highest duration of illness in both the group is 1-2 years, it is about 43.4% and 33.4% in Experimental and Control group respectively.

Compared to other respiratory diseases, Bronchial asthma lies at 20.0% and 33.3% in Experimental and Control group respectively in the study population.

30.0% of Experimental and 33.3% of Control group have diabetes mellitus and none of them have stroke or cardio vascular disease.

Based on frequency and distribution of airway clearance assessment scale score before administering halo therapy

- The symptoms of chronic obstructive pulmonary disease such as respiratory rate, auscultation findings of lungs , modified saturation scale, modified medical research council (MRC)dyspnea scale, oxygen requirement and need for other medications were statistically had no significant difference between experiment and control group pre test airway clearance assessment scale score. It was calculated using chi square test

Findings of pre-test level of airway clearance assessment scale score of study participants

- In the pre-test airway clearance assessment scale score, none of the patients are having adequate level score, 80.0% of them are having moderate level score and 20.0% of them are having inadequate level score in experimental group and none of considering control group none of them having adequate level score,t 76.7% of them are having moderate level score and 13.3%% of them are having inadequate level score.

Based on frequency and distribution of airway clearance assessment scale score after administering Halotherapy

- The symptoms of chronic obstructive pulmonary disease such as respiratory rate, auscultation findings of lungs, modified saturation scale and modified medical

research council (MRC)dyspnea scale, statistically had significant difference between experiment and control group post- test airway clearance assessment scale score. It was calculated using chi square test.

- The symptoms of chronic obstructive pulmonary disease such asoxygen requirement and need for other medications were statistically had no significant difference between experiment and control group post -test airway clearance assessment scale score. It was calculated using chi square test.

Findings of post-test level of airway clearance assessment scale score of study participants

- In the post test airway clearance assessment scale score 13.3%of the patients are having adequate level score, 86.7% of them are having moderate level score and none of them are having inadequate level score in experimental group and in control group, none of the patients are having adequate level score, 90.0% of them are having moderate level score and 10.0%% of them are having inadequate level score. Statistically there is a significant difference in post-test level of airway clearance between experiment and control group. It was confirmed using chi square test

Findings of comparison of pretest and posttest airway clearance assessment scale score (Experiment)

- There is a significant reduction in the following symptom scores : Respiratory rate assessment, auscultation findings of lungs, modified saturation scale and modified (MRC) dyspnea scale. Statistically there is significant difference between pretest and posttest score in experimental group. It was calculated by using Extended McNemar's test.

Findings of comparison of pretest and posttest airway clearance assessment scale score (control)

- There is a significant reduction in the modified saturation scale symptom scores. Statistically there is significant difference between pretest and posttest score of control group. It was calculated using Extended McNemar's test.

Findings of pretest and posttest level of airway clearance assessment scale score(Experiment)

- In the pretest and post-test level of airway clearance assessment scale score of experimental group. In the pre-test, none of the patients are having adequate level score, 80.0% of them are having moderate level score and 20% of them are having inadequate level score and in post-test, 13.4% of the patients are having adequate level score, 86.70% of them are having moderate level score and none of them are having Inadequate level score in experimental group
- Statistically there is a significant difference between pre-test and post-test level of airway clearance assessment scale score in experiment group. It was confirmed using McNemar's test.

Based on pre-test and post-test level of airway clearance assessment scale score(Control)

- The pre-test and post-test level of airway clearance assessment scale score of control group. In pre-test, none of the patients are having adequate level score, 80.0% of them are having moderate level score and 20% of them are having inadequate level score and in post -test, none of the patients are having adequate level score, 100.0% of them are having moderate level score and none of them are having Inadequate level score
- Statistically there is no significant difference between pre-test and post-test level of airway clearance assessment scale score of control It was confirmed using McNemar'stest .

Findings of effectiveness of Halotherapy in improving airway clearance of experimental and control group

- Considering experiment group, patients are reduced 2.23 symptoms score, t= 13.62,p=0.001, this difference is statistically significant, whereas control group patients reduced 0.47symptoms score, t=1.91,p=0.06. this difference is statistically not significant. It was calculated using student paired t-test.

Findings of effectiveness of Halotherapy in improving airway clearance of experimental by comparing control group

Considering experiment group, On an average, in post-test, patients are **reduced 25.5%** of symptoms score after administration of **halotherapy** intervention, whereas considering control group, they reduced only 5.2% of symptoms score after **routine treatment**.

This 25.5% of symptoms score reduction score among experiment group shows the **effectiveness** of **halotherapy** intervention.

Findings in association between pre-test level of symptoms score and demographic variables among experiment and control group

- None of the variables are significantly associated with demographic variables. It was confirmed using chi square test.

Findings of association between post-test level of symptoms score and demographic variables among experiment group.

- Younger age group, females, sedentary workers, less duration of illness patients are benefitted more than others with the post- test level of airway clearance in the experiment group at $p< 0.05$ and economic status, place of living, nature of work, duration of smoking, other respiratory diseases and associated disorders had statistically no significant association with the post- test level of airway clearance in the experimental group. It was confirmed using chi square test.

Findings of association between post-test level of symptoms score and demographic variables among control group.

- None of the variables are significantly associated with demographic variables. It was confirmed using chi square test.

Findings of association between symptoms reduction score and demographic variables among experiment group

- Younger age group, females, sedentary workers, less duration of illness patients are benefitted more than others with the post test level of airway clearance in the control group at $p< 0.05$ and economic status, place of living, nature of work, duration of smoking, other respiratory diseases and associated disorders had statistically no significant association with the post -test level of airway clearance in the control group. It was confirmed using Oneway ANOVA F-test and student t-test.

Findings of association between symptoms reduction score and demographic variables among control group

- None of the variables are significantly associated with demographic variables. It was confirmed using One-way ANOVA F-test and student independent t-test.

DISCUSSION

CHAPTER-VI

DISCUSSION

This chapter discusses in detail about the findings of the analysis in relation to the objectives of the study,

Objective: 1 To assess the symptoms of chronic obstructive pulmonary disease in experimental and control group before administering halo therapy

The study findings shown that the symptoms of chronic obstructive pulmonary disease such as respiratory rate, auscultation findings of lungs , modified saturation scale, modified medical research council (MRC)dyspnea scale, oxygen requirement and need for other medications statistically had no significant difference between experiment and control group pre-test airway clearance assessment scale score. It was calculated using chi square test.

Objective: 2 To assess the effect of halotherapy in improving airway clearance in experimental group as post test.

The study findings showed that for experimental group the pre-test airway clearance assessment scale score, none of the patients are having adequate level score, 80.0% of them are having moderate level score and 20% of them are having inadequate level score and in post-test, 13.4% of the patients are having adequate level score, 86.70% of them are having moderate level score and none of them are having inadequate level score in experimental group. So significant improvement seen in post test level of airway clearance in experimental group.

The above result was supported by the study conducted by **Beamon S.Falkenbach A. (2001)**, on halotherapy for asthma. It includes controlled clinical trials in which the investigator compared clinical effects of halotherapy with another intervention or no intervention in clients with chronic asthma. Results showed that two trials reported that halotherapy had beneficial short term effect on lung function[38].

The above result was supported by the study conducted by **Tano L, Tano K. (2004)**, to assess the daily spray with saline prevents symptoms of rhinitis by experimental design. This study involving 10 weeks of daily saline nasal spray and 10weeks of only recording symptoms 108 healthy conscripts aged approximately 20 years. Data were recorded by the participants in a diary at home. A total of 69 subjects completed the 20 week diary period. During the spray period the number of days with nasal secretion and blocked nose (mean 6.4 days) was significantly (p=0.027) lower than that during the observation. Results showed daily nasal spray with saline can prevent nasal symptoms of common cold in a population of otherwise healthy adults[34].

Objective: 3 To find the effect of Halotherapy in improving airway clearance of experimental group by comparing control group.

The study findings showed that in experiment group, in an average, in post - test, patients are **reduced 25.5%** of symptoms score after administration of **halotherapy** intervention, whereas considering control group, they reduced only 5.2% of symptoms score after **routine treatment**. This 25.5% of symptoms score reduction score among experiment group shows the **effectiveness** of **halotherapy** intervention. Differences between pretest and post-test score was analysed using proportion with 95% Confidence interval and mean difference with 95% confidence interval.

Hypothesis(H_1) :

There is a significant improvement in airway clearance among patients with chronic obstructive pulmonary disease receiving Halotherapy in experimental group than control group.

Considering experiment group, patients are reduced 2.23 symptoms score, this difference is statistically significant, where as control group patients reduced 0.47 this difference is statistically not significant. It was calculated using student paired t-test. So the Hypothesis (H_1) was accepted.

The above result was supported by the study conducted by **Hedman .J, et al (2006)**, on effect of salt chamber treatment on bronchial hyper responsiveness in

asthmatics. Clinical controlled trial used with either another type of intervention or no intervention. Total of 124 clients were selected. Results showed that after 3 weeks of treatment by salt chamber reduces the bronchial hyper responsiveness as an add-on therapy in asthmatics with low to moderate dose of inhaled steroids. The possibility that salt treatment could serve as a compensatory therapy to conventional medication cannot be excluded.

Objective:4 To associate the demographic profile with the post test results

The study findings showed that theassociation between symptoms reduction score and Demographic variables among experiment group. Younger age group, females, sedentary workers, less duration of illness patients are benefitted more than others with the post test level of airway clearance in the experimental group at $p< 0.05$ and economic status, place of living, nature of work, duration of smoking, other respiratory diseases and associated disorders had statistically no significant association with the post test level of airway clearance in the control group. It was confirmed using Oneway ANOVA F-test and student.

IMPLICATIONS, CONCLUSION & RECOMMENDATION

CHAPTER –VII

IMPLICATIONS, RECOMMENDATIONS AND CONCLUSION

This chapter deals with the, implications for nursing practice, education, nursing research, administration and recommendations for future research, conclusion and limitations.

7.1. Nursing implications of the study:

The researcher has derived the following implications from this study, which are of vital concern in the field of nursing service, nursing administration, nursing education and nursing research.

7.1.1 Nursing Practice:

Halotherapy is a cost effective measure to improve the level of airway clearance and it helps in reducing the need of increasing the dose of drug. Method of administration is easy in salt therapy and continuity was needed to achieve maximum benefits. It can be used as adjunct therapy in clients with chronic obstructive pulmonary disease. It encourages to practice the halotherapy as a best adjuvant therapy to improve the airway clearance in respiratory disease.

7.1.2 Nursing Education:

Nurse educators should educate the nursing students to know about the alterative measures to improve the level of airway clearance. Nursing curriculum is a component of evidence based alternative management for common disorder. Nursing education can focus on organizing the workshop and conferences regarding halotherapy.

7.1.3 Nursing Administration:

The nurse administrator should take an active part in implementing the halotherapy in patient care management. The health care consumers are faced with economic climate that scrutinizes health services in terms of their outcomes and the duration of hospital stay. Halotherapy can be used as a best adjuvant therapy which

reduces the patient hospital stay. Nurse administrator plays an active role in conducting in-service education regarding benefits of halotherapy in the hospital settings.

7.1.4 Nursing Research:

The nurse researcher should realize the need according to the changing health care environment and the needs of the consumer by assessing the best and effective alternative method of therapy which help to improve the level of airway clearance in clients with chronic obstructive pulmonary disease. Student will get idea to replicate this study to show the uses and create awareness about halotherapy..

7.2 Recommendations:

1. Halotherapy can be added as a routine therapy in clinical setting for improving level of airway clearance.
2. The study can be replicated on large scale.
3. The study can be conducted as a one group pre test and posttest design.
4. Halotherapy can be compared with other adjuvant therapy.
5. The study can be conducted in other respiratory conditions (Cystic fibrosis).

7.3. Limitations of the study:

1. Clients need hospitalization for more than three days to acquire maximum benefits of halotherapy.
2. The investigator could not generalize the study findings since the sample size is small and the findings must be interpreted with caution.

Conclusion:

Study findings revealed that halotherapy was effective therapy in improving the level of airway clearance in the experimental group. So halotherapy can be used as a routine therapy for clearing the airway in clinical setting.

The study proved that there is a significant difference between post-test level of airway clearance among patients with chronic obstructive pulmonary disease.

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APPENDICES

INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE, CHENNAI 600 003

EC Reg.No.ECR/270/Inst./TN/2013
Telephone No.044 25305301
Fax: 011 25363970

CERTIFICATE OF APPROVAL

To
S.Barani
I Year M.Sc.(Nursing) Student
College of Nursing
Madras Medical College
Chennai 600 003

Dear S.Barani,

The Institutional Ethics Committee has considered your request and approved your study titled **"A STUDY TO ASSESS THE EFFECTIVENESS OF HALO THERAPY IN IMPROVING AIRWAY CLEARANCE AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ADMITTED IN SELECTED WARDS IN RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI 3 " NO. 01072016.**

The following members of Ethics Committee were present in the meeting hold on **12.07.2016** conducted at Madras Medical College, Chennai 3

1.Prof. C. Rajendran, MD.	Chairperson
2.Prof. Isaac Christian Moses,MD.,Dean(FAC)MMC ,Ch-3	Deputy Chairperson
3.Prof. Sudha Seshayyan, MD., Vice Principal, MMC.Ch- 3.	Member Secretary
4.Prof. B.Vasanthi,MD.,Prof of Pharmacology, MMC,	Member
5.Prof. P.Raghumani.MS., Professor of Surgery, Inst. of surgery	Member
6.Prof. Md Ali, MD.,DM., Prof & HOD of MGE, MMC,Ch-3.	Member
7.Prof. Baby Vasumathi.,MD, Director. Inst. of O&G,	Member
8.Prof. K.Ramadevi.,MD, Director, Inst of Bio-Chemistry, MMC,	Member
9.Prof. R.Padmavathy,MD., Professor, Inst.of Pathology, MMC,Ch	Member
10.Prof.S.Tito, MD, Director, Inst.of Inter Med, Ch-3.	Member
11.Tmt.J.Rajalakshmi, Junior Administrative Officer,MMC,Ch	Layperson
12.Thiru.S.Govindasamy., B.A.B.L., High Court, Chennai-1	Lawyer
13.Tmt.ArnoldSaulina, MA., MSW.,	Social Scientist

We approve the proposal to be conducted in its presented form.

The Institutional Ethics Committee expects to be informed about the progress of the study and SAE occurring in the course of the study, any changes in the protocol and patients information/informed consent and asks to be provided a copy of the final report.

Member Secretary – Ethics Committee

MEMBER SECRETARY
INSTITUTIONAL ETHICS COMMITTEE
MADRAS MEDICAL COLLEGE
CHENNAI-600 003

CERTIFICATE OF CONTENT VALIDITY

This is to certify that the tool constructed by Mrs.S.Barani M.Sc.,(Nursing) II year, College of Nursing, Madras Medical College which is to be used in her study titled, **"A study to assess the effectiveness of Halotherapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03''** has been validated by the undersigned. The suggestions and modifications given by me will be incorporated by the investigator in concern with their ,respective guide. Then he can proceed to do the research.

S. Mayilvahanan

Signature with seal

25/11/16

Dr. S. MAYIL VAHANAN, M.D.,
DIRECTOR & PROFESSOR
INSTITUTE OF INTERNAL MEDICINE
MMC & RGGGH
REG. No. 36893

Name:

Designation:

College:

Place:

Date:

CERTIFICATE OF CONTENT VALIDITY

This is to certify that the tool constructed by Mrs. S.Barani, M.Sc.,(Nursing) II year, College of Nursing, Madras Medical College which is to be used in her study titled, **"A study to assess the effectiveness ofHalotherapy in improving airway clearance among patients with Chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03"**has been validated by the undersigned. The suggestions and modifications given by me will be incorporated by the investigator in concern with their respective guide. Then she can proceed to do the research.

Apollo College of Nursing ★ Apollo College of Nursing ★ Chennai - 600 095

Signature with seal

Name: J. JASLINA GNANARANI

Designation: Reader

College: Apollo College of Nsg. Chennai

Place: Chennai

Date: 09/11/2016

Apollo College of Nursing ★ Apollo College of Nursing ★ Chennai - 600 095

CERTIFICATE OF CONTENT VALIDITY

This is to certify that the tool constructed by Mrs. S.Barani, M.Sc.,(Nursing) II year, College of Nursing, Madras Medical College which is to be used in her study titled, **"A study to assess the effectiveness ofHalotherapy in improving airway clearance among patients with Chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03"**has been validated by the undersigned. The suggestions and modifications given by me will be incorporated by the investigator in concern with their respective guide. Then she can proceed to do the research.

G. Kanchana
Signature with seal

Name: G. KANCHANA

Designation: READER

College: APOLLO COLLEGE OF NURSING

Place: CHENNAI

Date: 9/11/16.

Lr. no. 51 / CON, MMC / 2016. Dt. 21.11.2016.

REQUISITION LETTER

From

S.Barani,
M.Sc. (N) – II year student,
College of Nursing,
Madras Medical College, Chennai -03.

To

The Director,
Internal Medicine,
Rajiv Gandhi Government General Hospital,
Madras Medical College, Chennai – 03.

Through
The Principal,
College of Nursing, Madras Medical College, Chennai- 03.

Respected Sir/Madam,

Sub : Requesting permission to conduct research at Rajiv Gandhi Government General Hospital, Chennai – 03.

* * * *

I , M.Sc. Nursing II year student have to conduct the research study for the fulfilment of M.Sc (N) Programme. My topic is **"A study to assess the effectiveness of Halo therapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital,"Chennai - 03.**from 21/11/2016 to 18/12/2016 at 8.00 am to 8.00 pm. I assure that I will not disturb the routine activities of the selected wards.

With due respect, I request your good self to kindly permit me to conduct this study.

Thanking You

Yours sincerely,

S. Barani

(S.Barani)

Forwarded

21/11/16

DR. V. KUMARI, M.Sc(N).,Ph.D.,
PRINCIPAL
COLLEGE OF NURSING
MADRAS MEDICAL COLLEGE
CHENNAI - 600 003.

Submitted

S-Dy

22/11/16.

Dr. S. MAYIL VAHANAN, M.D.,
DIRECTOR & PROFESSOR
INSTITUTE OF INTERNAL MEDICINE
MMC & RGGGH
REG. No. 36893

TOOL FOR DATA COLLECTION

SECTION A : DESCRIPTION ON DEMOGRAPHIC DATA

Sample number :

Purpose: To gather information related to age, sex, economic status, place of living, occupation, nature of work and so on.

Instruction:

- The interviewer requested the respondent to answer the following questions . She reads the various options mentioned under the corresponding questions.
- Repeat the answer till they understand.
- Allow the respondent to answer and place a tick mark( ) on the answer sheet.
- All the information provided will be confidential.

DEMOGRAPHIC DATA:

1. Age
    a. 21 – 30 Yrs ( )
    b. 31 – 40 Yrs ( )
    c. 41 – 50 Yrs ( )
    d. 51 – 60 Yrs ( )

2. Sex
    a. Male ( )
    b. Female ( )

3. Economic Status
    a. Lower class ( )
    b. Middle class ( )
    c. Upper class ( )

4. Place of living
    a. Urban ( )
    b. Rural ( )
    c. Industrial area ( )
    d. Near to cotton industry ( )

5. Occupation
    a. Sedentary ( )
    b. Moderate Worker ( )
    c. Heavy Worker ( )

6. Nature of work
    a. Cotton industry ( )
    b. Cement Industry ( )
    c. Coal mines ( )
    d. Sugar cane industry ( )
    e. None of the above ( )

7. Duration of smoking

a. 1-2 years ( )

b. 2-3 years ( )

c. 3-4 years ( )

d. More than 5 years. ( )

8. Duration of Illness

a. 1 Year ( )
b. 1-2 Year ( )
c. 2-3 years ( )
d. Above 3 years ( )

9. Other Respiratory Disease

a. Tuberculosis ( )
b. Bronchial asthma ( )
c. Pneumonia ( )
d. No other respiratory diseases ( )

10. Comorbid illness

a. Diabetes mellitus ( )
b. Stroke ( )
c. Cardiovascular Disease ( )
d. No Other disorders ( )

தனிநபர் விபரம்

பகுதி-அ: அடிப்படை தகவல்கள்

மாதிரி எண்:

நோக்கம்

அடிப்படை தகவல்களான வயது, பாலினம், பொருளாதார நிலை, வாழ்விடம், தொழில், பணியின் இயல்பு, புகைப்பழக்க காலம், சுவாச நோய் காலம் ஆகியவற்றை பெறுவதற்காக.

1) வயது

அ) 21-30 வயது ☐

ஆ) 31-40 வயது ☐

இ) 41-50 வயது ☐

ஈ) 51-60 வயது ☐

2) பாலினம்

அ) ஆண் ☐

ஆ) பெண் ☐

3) பொருளாதார நிலை

அ) கீழ்வர்க்கம் ☐

ஆ) நடுத்தர வர்க்கம் ☐

இ) உயர் வர்க்கம் ☐

4) வாழ்விடம்

அ) நகரம் ☐

ஆ) கிராமம் ☐

இ) தொழிற்சாலை பகுதி ☐

ஈ) பஞ்சு தொழிற்சாலைக்கு அருகில் ☐

5) தொழில்

அ) அரசாங்க வேலை ☐

ஆ) தனியார் வேலை ☐

இ) சுய தொழில் ☐

ஈ) வேலை ஏதும் இல்லை ☐

உ) ஓய்வூதியம் பெறுபவர் ☐

6) பணியின் இயல்பு

அ) பஞ்சு தொழிற்சாலை ☐

ஆ) சிமெண்ட் தொழிற்சாலை ☐

இ) நிலக்கரி சுரங்க வேலை ☐

ஈ) கரும்பு தொழிற்சாலை ☐

7) புகைப் பழக்க காலம்

அ) 1-2 வருடங்கள் ☐

ஆ) 2-3 வருடங்கள் ☐

இ) 3-4 வருடங்கள் ☐

ஈ) 5 வருடங்களுக்கு மேல் ☐

உ) புகைப்பழக்கம் இல்லை ☐

8) எத்தனை வருடங்களாக நோய் உள்ளது

அ) 1 வருடம் ☐

ஆ) 2 வருடம் ☐

இ) 2-3 வருடம் ☐

ஈ) 3 வருடங்களுக்கு மேல் ☐

9) சுவாச நோய்

அ) பிராங்கைட்டிஸ் ☐

ஆ) ஆஸ்துமா ☐

இ) எம்பைசீமா ☐

ஈ) நாள்பட்ட நுரையீரல் அடைப்பு நோய் ☐

10) தொடர்புடைய கோளாறுகள்

அ) சர்க்கரை நோய் ☐

ஆ) பக்கவாதம் ☐

இ) இதய நோய் ☐

ஈ) மற்ற நோய்கள் ☐

SECTION-B Airway Clearance Assessment Scale

The scoring of the airway clearance assessment scale was described as below

1. **Respiratory Rate Assessment**

S.NO	Respiratory Rate	Score
1.	Severe Tachypnea (More than 40 breaths /min)	2
2.	Tachypnea (25-38 breaths/ min)	1
3.	Normal (16- 24breaths/min)	0

2. Auscultation Findings of Lungs

S.NO	Breath Sounds	Score
1.	No abnormal breath sounds	0
2.	Moderate wheeze	1
3.	Extensive wheeze	2
4.	Crackles	3

3. Modified Saturation Scale

S.NO	Level	Score
1.	More than 94%	0
2.	90-93%	1
3.	88-89%	2

4. Modified Medical Research Council (MRC)Dyspnea Scale

S.NO	Degree of breathlessness related to activities	Score
1.	No breathlessness except with strenuous exercise	0
2.	Breathlessness when hurrying on the level or walking up a slight hill	1
3.	Walk slower on level ground because of breathlessness or has to stop for breath when walking at own phase	2
4.	Stops for breath after walking about 100 meter or after a few minutes on level ground	3
5.	Too breathlessness to leave the house or breathlessness when dressing or undressing	4

5. Oxygen requirement

S.NO	Oxygen Liters/minute	Score
1.	Not required	0
2.	2-4 Liters/minute	1
3.	4-6 Liters/minute	2
4.	Above 6 liters/minute	3

6. Need for other medications

S.NO	Medications	Score
1.	Additional nebulization	1
2.	1 + Cortico steroids	2
3.	1+2+ Systemic Broncho dilators	3

SCORING INTERPRETATION

Total Score: 17

S.NO	LEVEL	SCORE
1.	Adequate	0-4
2.	Moderately Adequate	5-9
3.	Inadequate	10-17

PATIENT CONSENT FORM

TITLE: "A STUDY TO ASSESS THE EFFECTIVENESS OF HALOTHERAPY IN IMPROVING AIRWAY CLEARANCE AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ADMITTED IN SELECTED WARDS IN RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-03."

Name of the Participant :

Date :

Age/sex :

Name of the Principal Investigator: S. Barani

Name of the Institution : RGGGH, Chennai-03.

Enrollment No :

Documentation of the Informed Consent: (legal representative can sign if the participant is minor or incompetent)

- I ..... have read the information in this form (or it has been read to me). I was free to ask any questions and they have been answered. I am over 18 years of age and exercising my free power of choice, hereby give my consent to be included as a participant in the study.
- I have read and understood this consent form and the information provided to me.
- I had the consent document explained in detail to me.
- I have been explained about the nature of my study.
- My rights and responsibilities have been explained to me by the investigator.
- I am aware of the fact that I can option out of the study at any time without having to give any reason and this will not affect my future treatment in this hospital.

- I hereby give permission to the investigator to release the information obtained from me as result of participation in this study to the sponsors, regulatory authorities, Government agencies and IECI, understand that they are publicly presented.
- I have had my questions answered to my satisfaction.
- I have decided to be in the research study.
- I am aware that if I have any question during this study, I should contact the investigator. By signing this consent form I attest that that the information given in this

  document has been clearly explained to me and understood by me. I will be given a copy of this consent document.

1. **Name and Signature/thumb impression of the participant (or legal representative if participant incompetent)**

Name _____

Signature_____

Date _____

2. **Name and Signature of impartial witness (required for illiterate patients)**

Name _____

Signature_____

Date _____

Name and Signature of the Investigator or her representative obtaining consent:

Name_____

Signature_____

Date_____

INFORMATION TO PARTICIPANTS

TITLE:"A STUDY TO ASSESS THE EFFECTIVENESS OF HALOTHERAPY IN IMPROVING AIRWAY CLEARANCE AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ADMITTED IN SELECTED WARDS IN RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-03."

Name of the Participant :

Date :

Age/sex :

Name of the Principal Investigator: S. Barani

Name of the Institution : RGGGH, Chennai-03.

Enrollment No :

You are invited to take part in this research/study/procedures. The information in this document is meant to help you decide whether or not to take part. Please feel free to ask if you have any queries or concerns.

You are being asked to participate in this study being conducted at Rajiv Gandhi Government General Hospital, Chennai-03.

What is the purpose of the Research (explain briefly)

This research is conducted to "A study to assess the effectiveness of Halotherapy in improving airway clearance among patients with chronic obstructive pulmonary disease admitted in selected wards in Rajiv Gandhi Government General Hospital, Chennai-03".

We have obtained permission from the Institutional Ethics Committee.

Study Design

Quasi experimental research design.

Study procedure

1. The study will be undertaken after approval from institutional ethics committee.

2. Those who are willing to participate will be enrolled and informed consent will be obtained.

3. The patients with chronic obstructive pulmonary disease who fulfil the inclusion criteria and exclusion criteria are selected for the groups.

4.The patients of experimental and control group are assessed for by using Airway clearance assessment scale and scoring done.

5.3% hypertonic normal saline nebulization given to the experimental group patients only 12^{th} hourly for 3 days.

6. After 3 days both the groups are assessed by using the Airway clearance assessment scale

7 . Results of the study will be analysed by using descriptive and inferential statistics.

Possible risks to you-Briefly Mention.

No risks involved.

Possible benefits to you

After finishing this study, investigator will improve the airway clearance among the patients with chronic obstructive pulmonary disease.

Possible benefits to other people

The result of the research may provide benefits to the patients with chronic obstructive pulmonary disease and to the society in terms of drug free nebulization for those patients with chronic obstructive pulmonary disease.

Confidentiality of the information obtained from you

You have the right to confidentiality regarding the privacy of your medical information (personal details, results of physical examinations, investigations, and your medical history). The information from this study, if published in scientific journals or presented at scientific meetings, will not reveal your identity.

Your privacy in the research will be maintained throughout the study in the event of any publication or presentation resulting from research, no personal identity information will be shared.

How will your decision not to participate in the study affect you?

Your decision not to participate in this research study will not affect your daily living activities, medical care or your relationship with investigator or the institution.

Canyou decide to stop participating in the study once you start?

The participation in this research is purely voluntary and you have the right to withdraw from this study at any time during the course of the study without giving any reasons. The result of the study will be informed to you at the end of the study.

Signature of the Investigator
Date:

Signature of the Participant
Date:

ஆராய்ச்சி ஒப்புதல் கடிதம்

ஆராய்ச்சியின்தலைப்பு : 3% உப்புக் கரைசல் 4மி.லி-யை சுவாச மருந்தாக உபயோகப் படுத்தி அதன் பயனை நாள்பட்ட நுரையீரல் அடைப்பு நோய் உள்ளவர்களுக்கு பரிசோதனை செய்தல்.

ஆய்வாளர் பெயர் : சு.பரணி

பங்கேற்பாளர் பெயர் :

தேதி :

வயது/பால் :

- ஆய்வாளர் மேற்கொள்ளும் ஆராய்ச்சியில் பங்கேற்க யாருடைய கட்டாயமுமின்றி முழுமனதுடனும் சுயநினைவுடனும் சம்மதிக்கிறேன்.
- ஆய்வாளர் மேற்கொள்ள போகும் பரிசோதனைகளை மிக தெளிவாக விளக்கிக் கூறினார்.
- எனக்கு விருப்பமில்லாத பட்சத்தில் ஆராய்ச்சியிலிருந்து எந்நேரமும் விலகலாம் என்பதையும் ஆய்வாளர் மூலம் அறிந்து கொண்டேன்.
- இந்த ஆராய்ச்சி ஒப்புதல் கடிதத்தில் உள்ள விவரங்களை நன்கு புரிந்து கொண்டேன். எனது உரிமைகள் மற்றும் கடமைகள் ஆராய்ச்சியாளர் மூலம் விளக்கப்பட்டது.
- நான் ஆராய்ச்சியாளருடன் ஒத்துழைக்க சம்மதிக்கிறேன். எனக்கு ஏதேனும் உடல்நலக்குறைவு ஏற்பட்டால் ஆராய்ச்சியாளரிடம் தெரிவிப்பேன்.
- நான் வேறு எந்த ஆராய்ச்சியிலும் தற்சமயம் இடம்பெறவில்லை என்பதை தெரிவித்து கொள்கிறேன்.
- இந்த ஆராய்ச்சியின் தகவல்களை வெளியிட சம்மதிக்கிறேன். அப்படி வெளியிடும் போது என் அடையாளம் வெளிவராது என்பதை அறிவேன்.
- எனக்கு இந்த ஒப்புதல் கடிதத்தின் நகல் கொடுக்கப்பட்டது.

ஆய்வாளர் கையொப்பம் பங்கேற்பாளர் கையொப்பம்

தேதி தேதி

ஆராய்ச்சி தகவல் தாள்

ஆய்வின் தலைப்பு : 3% உப்புக் கரைசல் 4மி.லி-யை சுவாச மருந்தாக உபயோகப் படுத்தி அதன் பயனை நாள்பட்ட நுரையீரல் அடைப்பு நோய் உள்ளவர்களுக்கு பரிசோதனை செய்தல்

பங்கேற்பாளர் பெயர் :

ஆய்வாளர் பெயர் : சு. பரணி

ஆய்வு நடைபெறும் இடம் : ராஜீவ் காந்தி அரசு பொது மருத்துவமனை, சென்னை -03.

..... என்பவராகிய நான் இந்த ஆய்வின் விவரங்களும் அதன் நோக்கங்களும் முழுமையாக அறிந்து கொண்டேன். எனது சந்தேகங்கள் அனைத்திற்கும் தகுந்த விளக்கம் அளிக்கப்பட்டது. இந்த ஆய்வில் முழு சுதந்திரத்துடன் மற்றும் சுயநினைவுடன் பங்கு கொள்ள சம்மதிக்கிறேன்.

1. நான் இந்த ஒப்புதல் தகவல் தாள் படித்து புரிந்து கொண்டேன்.

2. இச்சுய ஒப்புதல் படிவத்தை பற்றி எனக்கு விளக்கப்பட்டது.

3. எனக்கு விளக்கப்பட்ட விஷயங்களை நான் புரிந்து கொண்டேன். நான் எனது சம்மதத்தை தெரிவிக்கிறேன்.

4. இந்த ஆய்வினை பற்றிய அனைத்து தகவல்களும் எனக்கு தெரிவிக்கபட்டது.

5. இந்த ஆய்வில் எனது உரிமை மற்றும் பங்கினை பற்றி அறிந்து கொண்டேன்.

6. இந்த ஆய்வில் ஏற்படும் பாதிப்புகள் பற்றி எனக்கு விளக்கம் அளிக்கப்பட்டது.

7. நான் ஆய்வாளருக்கு முழு ஒத்துழைப்பு அளிப்பேன், மேலும் எனக்கு பக்கவிளைவு எதாவது ஏற்பட்டால் ஆய்வாளருக்கு உடனடியாக தெரிவிப்பேன்.

இந்த ஆய்வில் பிறரின் நிற்பந்தமின்றி என் சொந்த விருப்பத்தின் பேரில் தான் பங்கு பெறுவேன், மற்றும் நான் இந்த ஆராய்ச்சியிலிருந்து எந்த நேரமும் பின் வாங்கலாம் என்பதையும் நான் புரிந்து கொண்டேன்.

இந்த ஆய்வில் கலந்துகொள்வதின் மூலம் என்னிடம் பெறப்படும் தகவலை ஆய்வாளர் இன்ஸ்டிட்யூசனல் எத்திக்ஸ் கமிட்டியினரிடமோ, அரசு நிறுவனத்திடமோ தேவைப்பட்டால் பகிர்ந்து கொள்ளலாம் என சம்மதிக்கிறேன்.

இந்த ஆய்வின் முடிவுகளை வெளியிடும் போது எனது பெயரோ அடையாளங்களோ வெளியிடப்படாது என அறிந்து கொண்டேன்.

இந்த ஆய்வில் பங்கேற்கும் பொழுது ஏதேனும் சந்தேகம் ஏற்பட்டால் உடனே ஆய்வாளரை தொடர்பு கொள்ள வேண்டும் என அறிந்து கொண்டேன்.

இந்த ஆராய்ச்சி தகவல் தாளில் கையழுத்திடுவதின் மூலம் இதிலுள்ள அனைத்து விஷயங்களும் எனக்கு தெளிவாக விளக்கப்பட்டது என்று தெரிவிக்கிறேன் மற்றும் ஆராய்ச்சியையும் புரிந்து கொண்டேன். இந்த ஒப்புதல் படிவத்தின் நகல் எனக்கு கொடுக்கப்படும் என்று தெரிந்து கொண்டேன்.

ஆய்வினால் ஏற்படும் நன்மைகள்

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பங்கேற்பாளர் கையொப்பம் தேதி :

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This is to certify that the dissertation work **"A STUDY TO ASSESS THE EFFECTIVENESS OF HALOTHERAPY IN IMPROVING AIRWAY CLEARANCE AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ADMITTED IN SELECTED WARDS IN RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-03",** done by Mrs. S.BARANI, M.Sc (N)- II Year Student of College of Nursing, Madras Medical College, Chennai-03 is edited for English language appropriateness .

SIGNATURE : 03/8/17

DESIGNATION :

SEAL :

Mrs. M. UMA DEVI, M.A.,M.Ed.,M.Phil.,
P.G.TEACHER IN ENGLISH
GOVT. BOYS HIGHER SECONDARY SCHOOL
CHROMEPET, CHENNAI - 600 044.

CERTIFICATE OF TAMIL EDITING

TO WHOMSOEVER IT MAY CONCERN

This is to certify that the dissertation work **A STUDY TO ASSESS THE EFFECTIVENESS OF HALOTHERAPY IN IMPROVING AIRWAY CLEARANCE AMONG PATIENTS WITH CHRONIC OBSTRUCTIVE PULMONARY DISEASE ADMITTED IN SELECTED WARDS IN RAJIV GANDHI GOVERNMENT GENERAL HOSPITAL, CHENNAI-03,** done by Mrs. S.BARANI, M.Sc (N)- II Year, Student of College of Nursing, Madras Medical College, Chennai-03 is edited for Tamil language appropriateness .

SIGNATURE :

DESIGNATION :

SEAL :

25/07/17

V. PALANISAMY, M.A.,M.Phil.,B.Ed.,
P.G. Assistant In Tamil,
Govt. Boys Hr. Sec. School,
Chromepet, Chennai - 600 044.

HALOTHERAPY PROCEDURE

Definition

Halotherapy (halo means salt in Greek) is one of such methods, which uses natural salt cave micro climate. It is also known as dry salt therapy or a form of saline solution inhalation. It means breathing a negative ion rich dry salt micro-climate, just like in natural salt mines. It is a natural safe, non- invasive, alternative therapy which is also very relaxing.

Indications for use

To relieve the symptoms of the following conditions

- Chronic obstructive pulmonary disease
- Cold
- Chronic wheezing
- Pneumonia after acute stage mucosal edema
- Chronic bronchitis
- Rhinitis

Action of dry sodium chloride aerosol on respiratory tract:

- Enhancement of respiratory host defenses
- Bacteriostatic effect
- Anti edematous effect
- Enhancement of colonization resistances of epithelial cells
- Enhancement of local immune and biological defense
- Activation of biological defense
- Activation of phagocytes activity
- Activation of ciliated epithelium function

Mechanism of action

- The main effective factor is a curative breathing environment which is saturated with dry sodium chloride aerosol at a mass concentration varying from 1-16 mg/m3 with a particle size of 1-5 um. Dry sodium chloride aerosol has a negative charge of the particles. The inner surface of airway has positive charges. Negatively charged particles of the dry sodium chloride aerosol move into lumen of the respiratory tract and settle intensively compared to neutral particles.
- Hypertonic saline solution, by absorbing water from the submucosa, can theoretically reverse some of the submucosal and adventitial edema and decrease the thickness and dryness of the mucous plaques inside the bronchiolar lumen.

Halotherapy Procedure

Assessing the patient's symptoms by using airway clearance assessment scale which include respiratory rate, auscultation findings, saturation level, modified dyspnea scale. Scoring was done. 3% (NS) hypertonic saline nebulization given for 10 -20 minutes for 3 days. After 3 days the patient is assessed for the symptoms by using same airway clearance assessment scale. Both the score pre-test and post-test score were entered daily in the coding sheet.

SAMPLE NO	AGE	SEX	ECONOMIC STATUS	PLACE OF LIVING	OCCUPATION	NATURE OF WORK	DURATION OF SMOKING	DURATION OF ILLNESS	OTHER RESPIRATORY DISEASE	ASSOCIATED DISORDER	
1	D	A	A	A	D	E	D	A	D	D	
2	D	A	A	A	D	E	D	D	D	D	
3	D	B	A	A	D	E	E	A	D	D	
4	D	A	B	B	D	E	D	B	D	D	
5	C	B	A	A	D	E	E	A	D	A	
6	D	A	B	A	D	E	D	A	D	A	
7	D	A	B	B	D	E	D	B	D	A	
8	D	A	B	A	D	A	B	B	D	D	
9	D	B	B	B	D	E	E	C	D	D	
10	D	B	B	B	D	A	E	B	D	D	
11	D	A	B	B	D	D	D	D	B	D	
12	C	A	B	A	B	E	D	C	D	D	
13	D	A	B	B	D	E	D	B	D	D	
14	C	A	B	A	C	E	D	B	D	D	
15	D	A	B	B	D	E	C	D	D	A	
16	C	A	B	B	B	B	D	D	A	D	
17	D	A	B	A	B	D	D	D	D	A	
18	D	A	B	B	D	E	D	B	D	D	
19	D	A	B	B	C	E	C	B	D	A	
20	D	A	B	A	B	A	D	B	D	A	
21	C	B	B	B	D	E	E	B	D	A	
22	D	A	B	A	B	B	D	B	D	D	
23	D	A	B	D	B	A	D	D	B	A	
24	D	A	B	B	B	B	D	C	A	D	
25	C	A	B	C	B	B	D	D	B	D	
26	C	A	B	B	D	D	D	C	B	A	
27	C	A	B	B	B	B	A	A	D	A	
28	D	B	B	A	D	E	E	A	D	D	
29	D	A	B	A	C	E	D	A	D	D	
30	D	A	A	B	C	E	E	B	D	D	

EXPERIMENTAL GROUP

PRE TEST SECTION B AIRWAY CLEARANCE ASSESSMENT SCALE							
SCORING 0-4 MAXIMUM SCORE E 17							
Table1	Table 2	Table 3	Table4	Table 5	Table 6	Total	%
1	1	2	2	1	2	9	53%
1	1	2	2	1	2	9	52.94
1	2	2	2	1	1	9	52.94
1	1	2	1	1	2	8	47.05
1	1	2	1	1	2	8	47.05
1	2	2	2	1	1	9	52.94
1	2	2	2	1	1	9	52.94
1	1	2	2	1	2	9	52.94
1	1	2	2	1	2	9	52.94
1	1	2	1	1	2	8	47.05
1	1	2	1	1	3	9	52.94
1	1	2	1	1	2	8	47.05
1	2	2	2	1	2	10	58.82
1	1	2	1	1	1	7	41.17
1	1	2	2	1	1	8	47.05
1	1	2	1	1	2	8	47.05
2	1	2	2	1	3	11	64.7
1	2	1	2	2	2	10	58.82
1	1	1	1	1	2	7	41.17
1	1	2	2	2	2	10	58.82
1	1	1	2	1	2	8	47.05
1	1	1	1	1	2	7	41.17
1	1	2	2	1	2	9	52.94
1	1	2	2	1	3	10	58.82
1	2	2	1	1	2	9	52.94
1	1	2	2	1	2	9	52.94
1	1	2	2	1	2	9	52.94
1	1	2	1	1	2	8	47.05
2	2	2	1	1	2	10	58.82
1	2	1	1	1	2	8	47.05

POST TEST SECTION B AIRWAY CLEARANCE ASSESSMENT SCALE SCORING 0-4 MAXIMUM SCORE 17							
Table1	Table 2	Table 3	Table4	Table 5	Table 6	Total	%
0	1	1	1	1	2	6	35.29
0	1	1	1	1	2	6	35.29
1	1	1	1	1	1	6	35.29
1	1	1	0	1	2	6	35.29
0	1	1	1	1	2	6	35.29
1	1	2	1	1	1	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	0	1	1	1	2	6	35.29
1	1	1	0	1	2	6	35.29
1	1	1	1	1	2	7	41.17
0	0	1	1	1	2	5	29.41
1	1	1	1	1	2	7	41.17
0	1	2	1	1	1	6	35.29
1	1	1	1	1	2	7	41.17
0	1	1	1	1	2	6	35.29
2	1	1	1	1	2	8	47.05
1	1	1	1	1	2	7	41.17
1	1	1	1	1	1	6	35.29
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	3	8	47.05
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	0	1	1	1	2	6	35.29
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17

SAMPLE NO	AGE	SEX	ECONOMIC STATUS	PLACE OF LIVING	OCCUPATION	NATURE OF WORK	DURATION OF SMOKING	DURATION OF ILLNESS	OTHER RESPIRATORY DISEASE	ASSOCIATED DISORDER	
1	B	A	B	D	B	A	C	B	A	D	
2	B	B	B	C	B	A	E	B	B	D	
3	D	A	B	A	E	E	D	D	B	A	
4	B	A	B	A	B	A	C	C	B	D	
5	B	B	B	A	B	A	E	B	A	D	
6	B	A	B	A	B	E	C	B	A	D	
7	C	A	B	C	B	D	D	C	B	D	
8	D	A	B	A	E	E	D	D	C	A	
9	B	B	B	A	B	A	E	B	B	D	
10	D	A	B	A	D	E	D	D	B	D	
11	D	B	B	B	D	E	E	D	B	A	
12	D	A	B	A	E	E	D	D	A	D	
13	C	B	B	B	D	E	E	C	B	D	
14	C	A	B	A	B	E	C	B	A	A	
15	C	A	B	A	B	E	C	B	B	A	
16	B	A	B	A	B	C	D	B	B	D	
17	D	B	B	A	D	E	E	B	B	D	
18	C	A	B	B	B	E	D	D	B	D	
19	D	A	B	A	D	E	D	D	B	A	
20	D	A	B	B	D	E	D	D	B	A	
21	C	A	B	A	B	B	D	D	A	D	
22	C	A	B	B	B	D	D	B	B	A	
23	C	A	B	A	B	E	D	D	A	D	
24	C	B	B	B	E	E	E	C	B	A	
25	B	A	B	C	B	B	C	B	B	D	
26	C	A	B	D	B	A	D	C	B	D	
27	D	B	B	A	D	E	E	D	A	A	
28	C	A	B	A	B	E	C	C	A	A	
29	D	A	B	A	B	A	D	D	B	D	
30	D	A	B	A	B	E	D	A	D	D	

CONTROL GROUP

PRE TEST SECTION -B AIRWAY CLEARANCE ASSESSMENT SCALE							
,SCORING 0-4 MAXIMUM SCORE 1E 17							
Table1	Table 2	Table 3	Table4	Table 5	Table 6	Total	%
1	2	2	1	1	2	9	53%
1	2	2	1	1	2	9	52.94
1	2	2	1	1	2	9	52.94
1	2	2	2	1	2	10	58.82
1	2	2	1	1	2	9	52.94
1	1	2	2	1	2	9	52.94
2	2	2	2	1	3	12	70.58
1	2	2	2	1	2	10	58.82
1	1	2	2	1	2	9	52.94
1	1	2	2	1	2	9	52.94
1	1	2	2	1	2	9	52.94
1	1	2	1	1	2	8	47.05
1	2	2	2	1	2	10	58.82
1	1	2	2	1	2	9	52.94
1	2	2	2	1	2	10	58.82
1	1	2	2	1	2	9	52.94
1	1	2	2	1	2	9	52.94
1	2	2	2	1	2	10	58.82
1	1	2	1	1	2	8	47.05
1	1	2	1	1	2	8	47.05
1	1	2	2	1	2	9	52.94
1	1	2	1	1	2	8	47.05
1	1	2	2	1	2	9	52.94
1	1	2	1	1	2	8	47.05
1	2	2	2	1	2	10	58.82
1	2	2	2	1	2	10	58.82
1	1	2	1	1	2	8	47.05
1	1	2	2	1	2	9	52.94
1	1	1	2	1	2	8	47.05
1	2	2	1	1	2	9	52.94

POST TEST SECTION -B AIRWAY CLEARANCE ASSESSMENT SCALE						,SCORING 0-4 MAXIMUM SCORE 1	
Table1	Table 2	Table 3	Table4	Table 5	Table 6	Total	%
1	1	1	1	1	2	7	41.17
1	1	2	1	1	2	8	47.05
1	1	1	1	1	2	7	41.17
1	1	2	2	1	2	9	52.94
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	2	2	1	1	2	9	52.94
1	1	1	2	1	2	8	47.05
1	1	1	2	1	2	8	47.05
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
0	1	1	1	1	2	6	35.29
1	1	2	2	1	2	9	52.94
1	1	1	2	1	2	8	47.05
1	1	1	2	1	2	8	47.05
1	1	2	1	1	2	8	47.05
1	1	1	1	1	2	7	41.17
1	1	1	2	1	2	8	47.05
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
0	1	2	1	1	2	7	41.17
1	1	1	2	1	2	8	47.05
1	1	1	2	1	2	8	47.05
1	0	1	1	1	2	6	35.29
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17
1	1	1	1	1	2	7	41.17